AVIATION WEEK

A McGRAW-HILL PUBLICATION

AUGUST 29, 1955

50 CENTS

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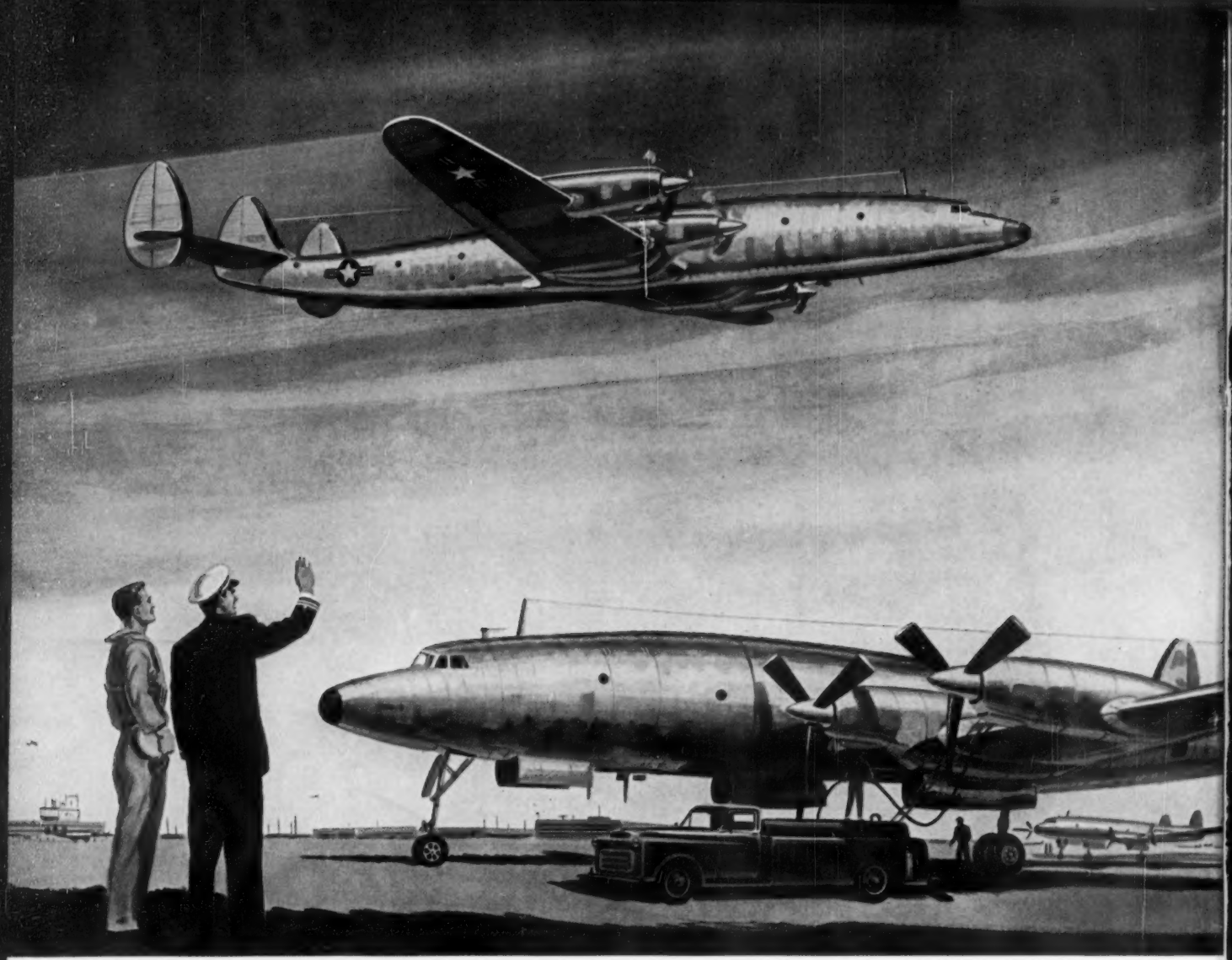
More airlines have chosen the Convair than any other modern passenger plane! Wherever you are, you'll find the Convair's performance is a model of engineering efficiency and dependability! For your comfort there are built-in steps, self-service luggage racks, and many other features that are now being planned for the passenger planes of tomorrow. The Convair offers you these advantages – *today!* Ask your favorite airline or travel agent to make your next flight a Convair – first choice all over the world!

CONVAIR A DIVISION OF GENERAL DYNAMICS CORPORATION



New Holley turboprop power control installed in Lockheed R7V-2

One hundred and six passengers or 36,000 pounds of cargo cruise at speeds up to 440-miles-per-hour in the Navy's new Lockheed R7V-2 turboprop Super Constellation. Four Pratt & Whitney Aircraft axial flow T-34 propeller turbine engines develop a total of 22,000 horsepower for take-off. Each of the four is automatically controlled by a new Holley gas turbine power control.

High performance turboprop engines like the T-34 demand extreme accuracy in fuel metering to maintain their high performance ratings and at the same time control operation within satisfactory limits. Through a system of accurately measuring four separate senses, the Holley control automatically meters corrected fuel flows to the engine in accordance with the engine operating requirements.

The Holley gas turbine control is the result of intensive research and development to provide a light weight, compact means of accurately metering fuel consistent with engine requirements.

This and other Holley developed fuel metering devices have played an important role in our country's undisputed leadership in the design, development and manufacture of superior aircraft.

HOLLEY Carburetor Co.

VAN DYKE, MICHIGAN

Leader In The Design, Development, and Manufacture of Aviation Fuel Metering Devices.

Say, Walter, which actuating system works best at **HIGH** temperatures?

Whatever the temperature—from a roasting 250° to a frigid—65°, pneumatic systems *always* give fast-acting, dependable performance! Because viscosity of the air used in pneumatic systems remains essentially the same over an extremely broad temperature range, the systems are *never* sluggish!

Pneumatic systems are weight-and-space savers, too! Smaller lines are used, and *no* return lines are required. What's more, you actually *store* energy from a lightweight, low-horsepower compressor, eliminating the need for a heavy, high-horsepower source!

With pneumatic systems, leakage is no serious problem. The compressor itself automatically compensates for any minor leaks which might occur. Nor is there any danger from fire with pneumatic systems, since the air used in the systems cannot burn!

We here at Kidde have a *complete* line of pneumatic system components, as well as facilities for engineering complete pneumatic systems. If *you* have a problem in pneumatics, please write us.

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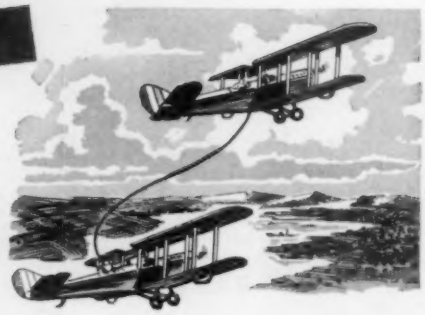
Phillips 66
PRESENTS

MILESTONES IN AVIATION

Fill 'er up!



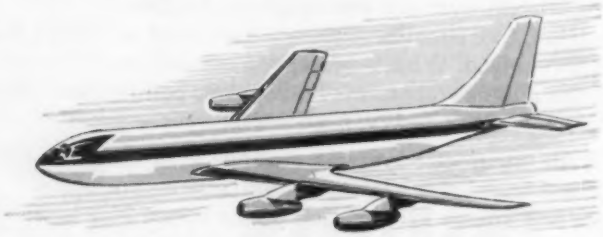
Even in the early days of aviation, far-seeing airmen were already visualizing the possibilities of mid-air refueling for long-range, non-stop flights. The first serious experiment was made by the U. S. Army in June, 1923, when two fliers in an Army DH-4BM, refueling in mid-air over San Diego, California, stayed aloft four days.

In January, 1929, mid-air refueling kept the U. S. Army Fokker tri-motor monoplane *Question Mark* in the air for 150 hours, 40 minutes—a new world's record.

In February, 1949, mid-air refueling enabled the U. S. Air Force four-engine bomber *Lucky Lady II* to make the first non-stop flight around the world . . . 23,452 miles in 94 hours, one minute.

Today, to a U. S. Air Force whose mission is global, mid-air refueling has become vital routine. It enables fighter planes carrying only a limited fuel load to cross the ocean non-stop. Mid-air refueling also enables the giant bombers of the U. S. Strategic Air Command to carry out missions of 10,000 miles and more, without ever touching wheels to runway. Entire squadrons of huge jet bombers now fly from America to Europe and return non-stop, thanks to the flying tankers.

The new U. S. Air Force Boeing KC-135 jet tanker (below), soon to go into service, will refuel jet bombers flying at a speed of more than 600 miles per hour.



For many years, Phillips Petroleum Company's research and development activities have been deeply concerned with aviation, and from Phillips laboratories have come many of the important discoveries that have resulted in producing high octane gasoline on an enormous scale. Phillips produces vast quantities of 115/145 grade aviation gasoline for military and commercial use, and is also manufacturing improved fuel for the latest designs in turbo-props and jets.

An important milestone in aviation was established by Phillips with the manufacture of Di-isopropyl and HF Alkylate, two power-packed aviation fuel components of utmost value to modern high-speed performance.

Operators know that Phillips *66* Aviation Products are always efficient and dependable.

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AVIATION PRODUCTS

AUGUST 29, 1955

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FACTS

about

NEW DEPARTURE BALL BEARINGS

New Departure split inner ring bearings are separable, facilitating cleaning, inspection and assembly into the engine. They carry heavy thrust loads from either direction and will also support major radial loads.

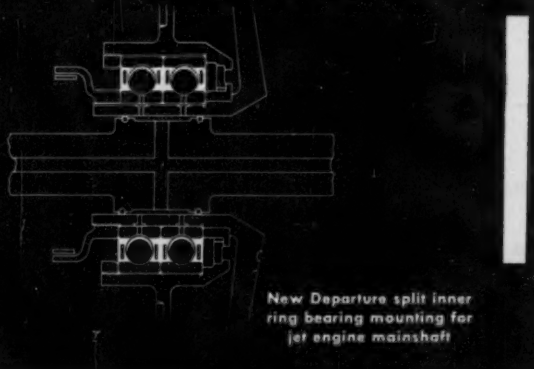
Research develops bearings for extreme speeds and temperatures

With the growing importance of the gas turbine in aircraft, ball bearings are being called on to meet increasingly severe conditions. For example, bearings that support the turbine wheels are subjected currently to temperatures up to 500° F. at high speeds and heavy thrust loads.

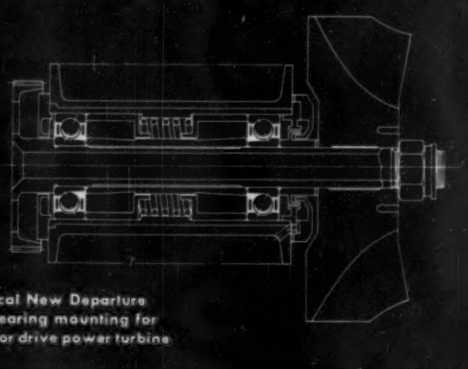
Anticipating still greater demands in the future, New Departure's Aircraft Research Program is already developing bearings for operational speeds of over 100,000 rpm and temperatures moving up towards 1000° F.

Typical of the bearings used in jet engines are New Departure's split inner ring types. These bearings are giving satisfactory performance in production engines today at extremely high speeds and heavy thrust loads. Write for full details.

TYPICAL JET AIRCRAFT APPLICATIONS



New Departure split inner ring bearing mounting for jet engine mainshaft



Typical New Departure ball bearing mounting for alternator drive power turbine

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

NEWS DIGEST

Domestic

The world's first supersonic speed record was set last week by Col. Horace A. Hanes in a North American Aviation F-100 Super Sabre. The new mark was recorded at approximately 825 mph. The exact figure is being calibrated and will be announced at the National Air Show at Philadelphia, Sept. 3-5 (see page 21). Col. Hanes made his supersonic runs at 35,000 ft. in a series of attempts that were plagued at the start by malfunctioning timing equipment.

First production B-58s are beginning to take shape at Convair's Fort Worth plant. Individual sections of the supersonic USAF bomber are being completed and some of the necessary tooling is ready. Production crews are finishing an all-metal simulated B-58 fuselage that will be used to determine the best methods of assembly.

North American Aviation signed a 10-year mutual assistance agreement with Rolls-Royce Ltd. that gives the British engine builder permission to manufacture rocket propulsion systems designed and developed by NAA. The pact also calls for an exchange of technical information on engineering, development and production. U.S. and British government approved the agreements, saying it supports the Wilson-Sandys collaboration pact on guided missiles signed by the two countries last year.

Nearly 2,000 V1650 engines and spare parts built by Packard Motor Co. under license from Rolls-Royce Ltd. during World War II will be sold as surplus by USAF's Air Materiel Command at Olmsted AFB, Middletown, Pa. Bids will be opened Sept. 13. The aircraft engines originally cost a total of $35 million. The spares were valued at $15 million.

Seaboard & Western Airlines completed a 120-day airlift of supplies to Northern Canada for construction of the Dew Line radar warning network. Operating under a subcontract from Boreal Airways of Montreal, S&W flew a fleet of DC-4s that included two eight-ton tankers converted from dry-cargo configuration.

Ryan Aeronautical Co. has been awarded a $2.5-million USAF contract for advanced development of avionic guidance systems for supersonic missiles.

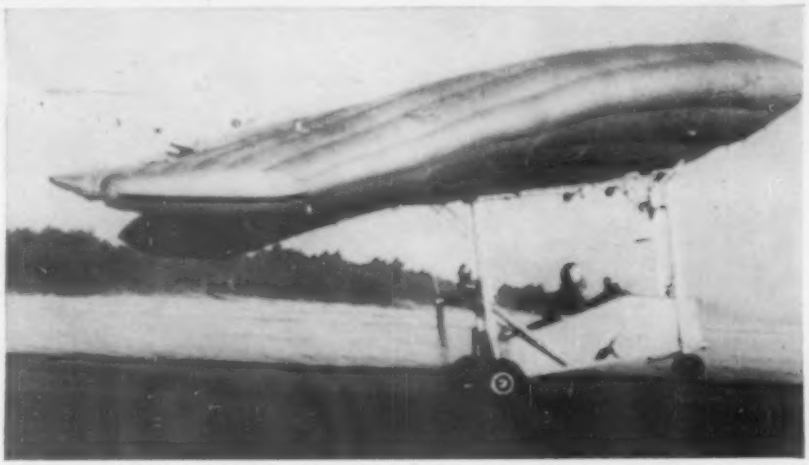
First $50,000 firm deposit for the four-place, twin-jet MS 760 business plane has been placed with Beech Aircraft Corp. by one of its distributors, J. D. Reed Co., Inc., Houston. Beech Aircraft says a number of corporations are interested in the French-designed jet. Now on a nationwide tour (AW June 27, p. 44), the MS-760 has made more than 400 demonstration flights in the past few months.

Wright Aeronautical Corp. received orders for 500 Turbo Compound engines from Douglas Aircraft Co. and 10 international airlines to power 100 DC-7Cs scheduled for delivery beginning next spring.

Civil aircraft equipment financing will be handled by a new company headed by Harold R. Harris, former president of Northwest Orient Airlines. Aviation Financial Services, Inc., New York, will serve the airline and corporate aircraft fields, using the equipment as primary collateral. Purchase and lease-back arrangements also will be used.

Gen. Bryant L. Boatner, 48, will retire from the Air Force at the end of August because of physical disability. His last assignment was Deputy Chief of Staff for Materiel. Boatner was awarded the Distinguished Service Medal for outstanding accomplishments in that post.

Air Carrier Service Corp. sold seven transports for a total of $3.7 million to three foreign airlines. Indian Airlines Corp. purchased three DC-4s, Real Transportes of Brazil bought two Convair 340s and Nipperi of Japan took two DC-3s.



Britain Orders Plane With Inflated Wings

Wings inflated by compressed air are features of this new 550-lb. utility two-seater, a number of which have been ordered by Britain's Ministry of Supply. Powered by a 65-hp. pusher engine, the unusual plane is stated to have a 100-mi. range. Wings span 40-ft. and can be detached for storage. Plane was designed by J. O. Lobelle, former designer for Fairey Aviation Co., Ltd., and was built by M. L. Aviation Co.

Financial

British European Airways reported a net profit of $176,509 for the fiscal year ended March 31, compared with a loss of $4,966,631 during the previous 12-month period. Operating revenues increased 16% to $47,995,679. Expenses were held to $47,819,170, only 3.2% above last year. Break-even load factor was reduced to 66.6% from 74.4% in Fiscal 1954-55.

Solar Aircraft Co.'s backlog of unfilled orders totaled $50 million this month, increasing from $36,620,100 during July. Net profit for the first quarter of the current fiscal year was $380,600, compared with $424,800 for the three-month period ended July 31, 1954. Sales dropped to $12,947,600 from $15,750,500.

International

English Electric Canberra streaked from London to New York and back in 14 hr. 20 min. Aug. 23, including a 35-min. turnaround at Floyd Bennett Field. On the 3,457-mile westbound leg, the British jet bomber averaged 481.52 mph. against 40-mph. headwinds and completed the flight in 7 hr. 29 min. Pushed by tail winds on the return flight, the Canberra crossed the Atlantic in 6 hr. 16 min. at an average speed of 550.35 mph.

TITANIUM helps the Voodoo work its magic...

McDonnell's new F-101 Voodoo, a supersonic long-range strategic fighter capable of delivering atomic weapons, depends upon REM-CRU titanium for vital parts . . . just as do most other advanced-type aircraft.

For titanium's high strength-weight ratio has made it an essential aircraft design material. And REM-CRU, a leading producer of titanium, led in the development of titanium alloys for aircraft applications. For example, REM-CRU titanium alloy grades C-110M and C-130AM are used extensively for primary structural fuselage frames, webs, stiffeners, angles, and wing spar fittings.

And because of REM-CRU's greatly expanded facilities you can be sure of *prompt* delivery of sheet, strip, plate, bars, wire, tubing and forgings . . . in a wide variety of sizes, shapes and grades – including new REM-CRU high-strength, weldable alloys. Let REM-CRU's engineering staff work with you on the application or fabrication of titanium.

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WHO'S WHERE

In the Front Office

V. N. Suciu, president of Monument Engineering Co. Other new officers of the Indianapolis firm: **R. L. Sink**, vice president and treasurer; **H. Happel**, chief engineer; **W. Jakelsky**, sales director; **J. Williams**, factory superintendent, and **G. Hopkins**, production control.

Anthony J. Ming, vice president of Trade Ayer Co., Linden, N. J.

I. H. McCaughey, vice president of Templet Industries, Inc., Brooklyn, N. Y.

Armand J. Thieblot, a director of Vitro Corporation of America. He is president of Thieblot Aircraft Co.

James E. Lockart, Jr., vice president, SAC Service Division of Southwest Airmotive, Dallas. Also promoted: **Paul A. Kennedy**, vice president, Distributor Sales Division; **Al Harting**, vice president-public relations and advertising; **John Bricker**, treasurer; **Lorraine Sanders**, secretary.

Honors and Elections

Arthur C. Storz, Omaha businessman and longtime proponent of air power, elected "Man of the Year" by the Air Force Assn.

Changes

H. O. Houchen, deputy operations director for British Overseas Airways Corp. Other changes: **J. R. Stainton**, general manager of stations and traffic; **Gilbert Lee**, general sales manager; **Charles Abell**, chief engineer, and **Capt. J. C. Harrington**, deputy director of flight operations.

Harry Stolar, assistant general manager of Bendix Aviation Corp.'s Marshall-Eclipse Division.

Alois Berny Essex, administrative engineer of Ford Instrument Co., division of Sperry Rand Corp.

Allen E. Smith, chief engineer of Socony Mobil Oil Co.'s aviation department.

Edward R. Toporeck, director of the field test and instrumentation staff for Ramo-Wooldridge Corp.'s Guided Missile Research Division. Other new directors in the division: **Dr. Edward B. Doll**, project control staff; **Allen F. Donovon**, aeromechanics and propulsion staff.

William L. Carolla, Chicago manager for Air Associates, Inc.

I. P. Grunwald, assistant to the controller of Lockheed Aircraft Corp.

Capt. George I. Myers retired from United Air Lines after 28 years with UAL's Flight Operations Division.

William A. Barnett, Los Angeles regional sales manager for Airwork Atlantic Ltd.

John T. Robinson, sales manager of Greer Hydraulics' Products Division.

Willis H. McLean, Miami traffic representative for Avensa Airlines.

W. D. Rothell, West Coast district manager, Stratoflex, Inc.

Ray E. Peterson, Honolulu district passenger service manager, United Air Lines.

Ralph Platt, managing editor of Pegasus, monthly publication of Fairchild Engine & Airplane Corp.

INDUSTRY OBSERVER

► Navy's Sidewinder air-to-air missile, developed by scientific teams at the Naval Ordnance Test Station at Inyokern, Calif., is expected to cost less than $1,000 per round in production. Estimated cost is about one-tenth that of comparable Navy Sparrow and USAF Falcon.

► **Capsule ejection system is being considered for Northrop's long range interceptor design.**

► Latest fast submarines, particularly those intended to be powered by nuclear reactors, are running into the same stability and control problems currently plaguing aerodynamicists. Cross-coupling between roll and yaw in sharp turns has necessitated "tail surface" modifications.

► **Bell Aircraft has developed a helicopter flight simulator which will give equivalent of four hours of primary flight instruction. The model 2-FH-2 will be installed at Navy Flight School, Pensacola, Fla. It was developed under contract with Office of Naval Research's Special Devices Center. Pilot's compartment is replica of Bell 47 cockpit, with dual controls and standard instrument panel.**

► Northrop Aircraft is scheduling its 50-ton Sheridan stretch-forming machine almost full time on sheet work for the North American Aviation F-100. The machine can handle 14 x 20-ft. sheet.

► **Falcon firing tests to check the dynamics of separation from the Convair F-102 have been made on half-scale model of the plane on the snort track at Inyokern Naval Ordnance Test Station.**

► Doman Helicopters, Inc, Danbury, Conn., believes it has an edge over other entries in Royal Canadian Navy's new anti-submarine helicopter competition because it is the only firm with copter manufacturing facilities in Canada—Doman-Fleet Helicopters, Ltd., Ont. Doman's proposal uses three General Electric T58 turbines and has folding tail and rotor blades for carrier stowage. A number of U. S. manufacturers have submitted designs to RCN, most of which are modifications of existing types.

► **Look for increased Army interest in the use of helicopters as fuel tankers to supply combat vehicles in the field. USAF is expected to begin "dry run" trials of several existing copter models at Edwards AFB soon. Under the fuel tanker helicopter concept, the craft would refuel vehicles and light Army aircraft while hovering overhead, and other helicopters in mid-air.**

► Rocket boost takeoff units used with Northrop SM-62 Snark impose 55G load on missile and affect reliability of avionic guidance components. Rather than redesign equipment mountings, company may use slower-burning rockets which will impose fewer G's.

► **Bell Aircraft's Texas Division has a human engineering contract for development of ideal all-weather helicopter flight instruments. Joint sponsors of the Ideal Man-Helicopter Engineering Project are Office of Naval Research, Bureau of Aeronautics, Army Transportation Corps. First step of the IMHEP contract calls for industry-wide survey of all prospective subcontractors to determine individual capabilities and their possible degree of participation in program. The Bell project closely parallels Navy's fixed-wing instrument development study which has been conducted by Douglas.**

► USAF's Aviation Engineer Force, Wolters AFB, Tex., is launching a new project to reclaim air bases after they have been hit by atomic bombs. New decontamination procedures and reconstruction methods will be perfected by the USAF unit to speed rehabilitation of airfields after an atomic bomb attack.

► **Fiber metallurgy, a new technique developed by Armour Research Foundation, may lead to an entirely new use of metals that promises better filters and rapid cooling of jet engine components. Other applications, based on stiffness-to-mass ratio of fiber bodies, may be in aeronautical skeletons to support plastics, ceramics or friction materials.**

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AVIATION CALENDAR

Sept. 3-5—Twenty-ninth National Aircraft Show, Philadelphia International Airport.

Sept. 6-11—Society of British Aircraft Constructors, Aircraft Show and Flying Display, Farnborough, England.

Sept. 7-10—American Society of Photogrammetry, semi-annual Convention and Trade Show, Statler Hotel, Los Angeles.

Sept. 8—Airwork-Pratt & Whitney Aircraft Forum, Millville, N. J. Second forum will be held Sept. 16 in Miami.

Sept. 12-15—American Meteorological Society's 139th National Meeting and Fifth Weather Radar Conference of Army Signal Corps, Fort Monmouth, N. J.

Sept. 12-16—Instrument Society of America, Instrument-Automation Conference and Exhibit, Shrine Exposition Hall and Auditorium, Los Angeles.

Sept. 17—Institute of Radio Engineers, Symposium on Automation, Cedar Rapids.

Sept. 17-18—Antique Airplane Assn., Convention and Fly-In, Ottumwa, Iowa.

Sept. 19-21—American Rocket Society, Western Fall Meeting, Los Angeles.

Sept. 21—Southwest Airmotive Engine Forum, sponsored by Pratt & Whitney and Bendix, Melrose Hotel, Dallas.

Sept. 21-22—American Helicopter Society, second West Coast Forum, Hollywood-Roosevelt Hotel, Hollywood, Calif.

Sept. 28-29—American Institute of Electrical Engineers and Institute of Radio Engineers, Park Sheraton Hotel, Detroit.

Sept. 29-30—Radio Technical Commission for Aeronautics, fall assembly, Hotel Statler, Washington, D. C.

Oct. 3-5—Eleventh National Electronics Conference, Hotel Sherman, Chicago.

Oct. 4-6—Eleventh annual Aircraft Spark Plug and Ignition Conference, sponsored by Champion Spark Plug Co., Secor Hotel, Toledo, Ohio.

Oct. 5-7—National Business Aircraft Assn., eighth annual Meeting and Forum, Sheraton-Cadillac Hotel, Detroit.

Oct. 5-7—1955 National Airports Conference, sponsored by American Association of Airport Executives and University of Oklahoma, Norman, Okla.

Oct. 5-9—World Plastics Fair and Exposition, National Guard Armory, Los Angeles.

Oct. 7—Escape from High Performance Aircraft Symposium, sponsored by Institute of Transportation & Traffic Engineering Ext. at U.C.L.A., Aeromedical-Engineering Assn., Institute of the Aeronautical Sciences, IAS Building, Los Angeles.

Oct. 11-15—Society of Automotive Engineers, Golden Anniversary Aeronautic Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles.

Oct. 17-21—National Safety Council, 43rd National Congress and Exposition, La Salle and Conrad Hilton hotels, Chicago.

Oct. 17-21—International Air Transport Assn., 11th annual general meeting, Waldorf-Astoria Hotel, New York.

Oct. 20-21—Sixth annual National Noise Abatement Symposium, Armour Research Foundation, Chicago.

PICTURE CREDITS

17—San Diego Tribune, San Diego Union; 33—(Top) Howard Levy, (Bottom) Wide World.

Washington Roundup

Quarles Differs

USAF's new Secretary Donald A. Quarles lifted a few Air Force eyebrows in the Pentagon with statements he made on a radio broadcast about 10 days after replacing Harold E. Talbott. Replying to questions by John Randolph Hearst, Quarles made these statements:

- **"I have no evidence** that the Soviets can make a truly effective changeover to new equipment more rapidly than we."
- **"Our present Air Force** goal of 137 wings is a sound goal."
- **"American youth is** . . . just as much attracted to a jet career (as ever)."

Air staff opinion, already expressed by top generals, and recruiting experience, widely publicized by USAF and its ROTC chiefs, indicate a differing viewpoint in each case. Initial reaction is expected to retard Quarles in his approach to the press. His reputation for conservative approach to publicity was one reason for the appointment.

India Bilateral

Civil Aeronautics Board is seeking an early start in renewing negotiations with India for a bilateral air transport agreement. A U. S. delegation, which will probably be headed by CAB Chairman Ross Rizley, is hopeful of leaving for India by late September. Because neither CAB nor the State Department have any fresh ideas on how to approach the Indians, U. S. flag-carriers have been invited to meet with CAB Sept. 8 for a preliminary discussion of what steps might be taken.

Advance consultation with the interested U. S. air carriers is expected to avoid the difficulties that developed when the U. S.-West Germany bilateral was announced. Additional problems are present in dealing with the Indians, however, since India denounced the previous air bilateral last January and has since given no indication of a desire for a renewal. Currently, the two U. S. airlines flying through India—Trans World Airlines and Pan American World Airways—are operating under a one-year unilateral grant which permits each carrier one stop with two flights weekly until Jan. 14, 1956.

Flying High

Prospects are that more than one legislative proposal will be introduced at the next session of Congress to ban the service of alcoholic beverages aboard commercial airliners. However, observers predict that it will be a situation that will develop more headlines than concrete action. There is a comparison here between the objections to liquor in flight and the continuing fight to grant "ministers of religion" free air transportation—congressmen are reluctant to vote against either proposition but neither can ever get out of committee.

Latest legislator opposing in-flight drinking is Rep. Thomas J. Lane (D.-Mass.) who said he will introduce a bill next January that would make it a federal crime to serve liquor on flights. Lane says he feels that the serving of drinks to airline passengers is a "dangerous custom . . . a potential nuisance to passengers and crews and is a threat to safety of all."

Not all of the scheduled airlines serve drinks as a passenger service. Capital Airlines, for example, does not and has strenuously appealed to the Civil Aeronautics Board for relief of "unfair competition" it allegedly has suffered. The Air Lines Pilot Assn. has passed a resolution opposing passenger drinking on flights, and a similar position is endorsed by the Airline Stewards and Stewardesses Assn.

West Coast Dispersal

West Coast has renewed its fight against the Air Force policy barring expansion of the aircraft facilities located there.

Sen. Thomas H. Kuchel (R.-Calif.) also is pushing the case at the White House. He has discussed the problem with Howard Pyle, a White House aide, who recently met with Los Angeles representatives.

"The question of dispersal is being carefully weighed by the White House staff and the Pentagon," Kuchel said. "I have been assured that there will be no discrimination in defense procurement against our state.

"A new Air Force Secretary has just taken office and is familiarizing himself with a multitude of problems."

Kuchel said there have been representations from California that the Air Force policy has caused much uneasiness and confusion among workers, management, civic officials and community leaders.

Broad-Base Pays Off

Recent flood havoc wrought on industrial installations in Northeastern U. S. pointed up efficacy of USAF broad-base production program. Damage, which in some cases was akin to towns being knocked out by enemy action, was not seriously affecting the output of major aviation firms in New York area, an AVIATION WEEK survey showed. Although Wright Aeronautical, Grumman and Republic reported that they were having difficulty establishing communication with suppliers in hard-hit towns; the companies felt that in most cases they could continue normal operations by asking second sources in unaffected areas to step up production of needed items until sources damaged by flood could get back into production.

Procurement Changes

While Defense Department ostensibly is studying Hoover Commission recommendations, changes quietly are being brought about that would correct some of the flaws found in current procurement practices. A Military Production Urgencies System has been created, spelling out pre-M-day and post-M-day guidance to prevent conflicts when the three services are competing for industrial output. T. P. Pike, Assistant Secretary for Supply and Logistics, has started to circulate memoranda to stimulate mobilization planning under the Production Allocation Program.

The Hoover Commission Task Force on Military Procurement was strongly critical of the Defense Department on both of these points. It found that Pike's office has been hampered by the fact that it "is not an effective participant in the logistical evaluation of military plans and is too far removed from their formulation to be so." At another point, it said that in the absence of a unified set of material requirements, "The Production Allocation Program has not been working efficiently and in some areas has been misleading."

—Washington staff

AVIATION WEEK VOL. 63, NO. 9
AUGUST 29, 1955

Airlines Seek Rapid Write-Off Extension

Industry fears suspension by ODM of quick tax benefits will inhibit transport aircraft purchases.

Washington, D. C.—Suspension of fast tax write-off benefits for airlines by the Office of Defense Mobilization is causing concern in the industry over future transport purchases.

Commercial transports were among a number of defense items caught in ODM's freeze of its rapid amortization program. Airlines have relied heavily on the tax benefit in its recent rounds of fleet modernization.

With the cost of commercial transports doubling within five-year periods, industry officials are expressing fears that lack of rapid amortization help will inhibit future purchases, especially in the expensive jet airliner field.

ODM is currently reviewing commercial aircraft along with 37 other suspended items for possible renewal or cancellation. A decision is expected within a few weeks, and the airline industry and Defense Air Transportation Administration are pressing for an extension of the commercial authority.

600-Aircraft Goal

Rapid tax amortization has been used by airlines in the past five years as an aid in the purchase of most of their modern equipment. Offered as an incentive for modernization of the commercial air fleet when the Korean war began, the program has been continued since then by ODM as a means of encouraging the airlines to keep their equipment up to date in the interest of national defense.

Under the plan, an airline can apply for a certificate of necessity which authorizes a fast tax writeoff on an aircraft purchase. The application is reviewed by the Defense Air Transportation Administration and a recommendation is made to ODM.

If ODM approves the certificate, the airline is allowed, for tax purposes, to depreciate 80% of the value of the aircraft in five years. This method defers tax payments and allows the airlines to build reserves faster to meet new purchase requirements.

Originally, ODM set a goal of 600 aircraft for the program. This goal was reached last November.

Review Under Way

Early this month, ODM suspended 38 goals, including commercial aircraft, and closed 19 others, leaving 20 of the original 225 goals still open. The suspended goals are being reviewed by the Defense Mobilization Board to determine whether adequate capacity exists or whether they should be extended to fulfill the program.

A major influence behind the ODM move is Secretary of the Treasury George M. Humphrey, who doesn't like to lose the tax receipts deferred by rapid amortization, and who feels that the plan is an artificial type of stimulation. Critics of fast write-offs for airlines say that the carriers are prosperous and don't need the incentive, that they will buy the airplanes anyway.

Proponents of a continued program base their argument on national interest—the cheapest way of keeping the nation's air transport capacity up to date. DATA has recommended that commercial aircraft be assigned an open-end goal which would set no numerical limit to the program. As an alternate, the agency has asked for a 300 aircraft extension. Current applications pending would take up more than two thirds of such an extension.

DATA bases its recommendation on the continuing need for a large, modern commercial air fleet. The agency feels that the program is of greater benefit to the national defense than it is to the airlines. DATA also is concerned with the Civil Reserve Air Fleet which must be kept abreast of technical development and which will probably have to be expanded in the future.

ATA Arguments

Support for the position of DATA is found in the Civil Air Policy submitted to the President in May 1954, by the Air Coordinating Committee. In one of its recommendations, the policy report says that for long range planning purposes there is an open-end requirement for expansion of transport air power limited only by what the taxpayer can afford for military transport capability and by sound promotional policies for civil transport.

Air Transport Assn. also supports expansion of the mobilization goals. ATA argues that promotion of a fleet of long range transports through a tax amortization program is one of the best bargains the government ever found. The association points out that the aircraft are purchased and maintained with private funds for both military and civilian use in an emergency.

ATA feels the airlines should be encouraged to buy as many aircraft as they can economically support. It is also pointed out that, unlike other items, airplanes must be depreciated and replaced quickly.

Rapid amortization is an aid to airlines in their borrowing for new purchases. Another factor involved is that

Tax Write-Off Applications

Airline	Number of Aircraft	Amount (In millions)
American Airlines	68	$117
Braniff Airways	9	19
Capital Airlines	60	64
Delta Air Lines	11	25
Eastern Air Lines	38	110
National Airlines	4	2.5
Northwest Airlines	21	49
United Air Lines	43	72
Western Air Lines	12	15

XV-3 Makes First Vertical Flight

Bell Aircraft's XV-3 convertiplane has made its first flight, hovering and maneuvering 20 feet above the ground, at the company's plant in Ft. Worth, Tex. Floyd Carlson, Bell's chief helicopter pilot, was at the controls.

Conversion to horizontal flight will be made later in the test program.

The Bell machine has rotor-propellers at the end of its 30-foot wings which rotate horizontally for vertical flight and can swing forward 90 degrees for long distance flights.

Developed by Bell and USAF's Air Research and Development Command, the convertiplane is an Army project, designed to increase the mobility of infantry soldiers in battle areas.

when a replacement for the DC-3 is established, the local airlines are going into a large-scale replacement program and will need rapid amortization aid.

Further support for the national interest arguments is found in the report of a Civil Aeronautics Board Industry Advisory Committee on Mobilization.

In its report, the committee says that the civil fleet, less the 317 plane Civil Reserve Air Fleet, would fall short of minimum war-time civil traffic requirements by 58 aircraft of the DC-7, DC-6A and L-1049G type.

Since the 600 aircraft mobilization goal was reached last November, applications for 266 aircraft have been received by the ODM. Until an extension is granted, these applications can't be considered. Presumably they were filed in order to be first in line if an extension should be granted.

USAF Warns Industry To Improve Avionics

Avionic manufacturers have been warned that if they do not improve electronic reliability the airframe industry will be forced to design and produce components for U. S. Air Force weapons systems.

Speaking at a Philadelphia conference called by U. S. Air Force and Radio Corp. of America, Maj. Gen. Thomas P. Gerrity, Assistant for Production Planning, Deputy Chief of Staff, Materiel, called for "an advanced technology of reliability." He added:

"The equipment manufacturer must take the lead in this effort, not the Air Force. The equipment manufacturer must prepare the specifications. In the final analysis, the Air Force can only review these specifications, advise, and offer constructive criticism based on past experience."

Gen. Gerrity said it is time for the industry to "get away from the radio and television type of component" because standards of reliability used in their design and manufacture do not suffice for modern weapons systems.

He said there are studies showing that the reliability of an aircraft on a mission comes from the degree of component reliability and the number of components in the equipment. Failure rates must be less than one in 20,000 to get 80% reliability out of a weapons system with 4,000 components.

For the future, Gen. Gerrity sees need for electronic aids that will be reliable at speeds of Mach 3 and above. New techniques of development are necessary to meet this challenge, he said, because design aims will be defeated if equipment for use at these speeds is produced with present standards of reliability.

Avionics' Manufacturers to Form Backbone of Automation Industry

By Philip Klass

San Francisco—Avionics' manufacturers will form the backbone of the fast-growing automation industry which is destined to become one of the nation's largest single industrial businesses with annual sales in the billions of dollars.

The above prediction was made by Dr. Dean Wooldridge, president of Ramo-Wooldridge Corp., in a speech before the Symposium on Electronics and Automatic Production attended here last week by more than 500 officials from almost as many companies and sponsored by the Stanford Research Institute and the National Industrial Conference Board.

The broad technical competence required to develop and produce modern military weapon systems, such as fire control and missiles, bears a striking similarity to what is needed to do an effective job in automating manufacturing and business operations, Wooldridge said.

The avionics executive told the symposium that, as a result of military weapons system work, avionics firms have the required competence in electronics, operational analysis, systems engineering and human engineering for the designing of highly-complex equipment for use by semi-skilled personnel.

"Many of the specific techniques and devices being used today in automation were developed in military electronics projects," Wooldridge pointed out in reference to such things as servo systems, computers and automatic data handling systems. He added that, "to a considerable extent, the equipment and methods of modern automation are today being developed by individuals who cut their teeth in military electronics work."

Two Approaches

Because of similarity, Wooldridge urged industry to profit from military experience and adopt the systems approach which is now being used in the development of new and complex weapons systems. The executive cited the unhappy experience of the military services during and shortly after World War II in buying individual "black boxes" and attempting to wed them to an integrated, smoothly-functioning fire-control or bombing system as a warning to industry against trying to piece together its own complex automation systems.

What is needed, Woolridge said, is a competent automation systems team, consisting of experts in business, industrial procedure, electronics, servo mechanisms and data handling equipment. Such a team could study the problem and come up with the best automation solution—or perhaps the answer that automation is not beneficial.

Certain large companies may find it economical to establish their own automation system teams. Smaller firms, however, will find it pays to employ the services of an outside organization with systems competence in the automation field, Wooldridge believes.

What American industry gets in return for the billions of dollars it will invest in automation equipment during the coming years will depend upon whether it uses the systems approach, Wooldridge said.

Competitive Advantage

"A forward looking automation program can enable a company—almost overnight—to cause an upheaval in its competitive field despite the fact that all its competitors are employing heavy sales artillery," Paul B. Wishart, president of Minneapolis-Honeywell warned the symposium.

Wishart also supported Wooldridge's position, declaring that: "The handling of this (automation) problem cannot be effectively delegated within an organization on the supposition that it is chiefly a matter of technology."

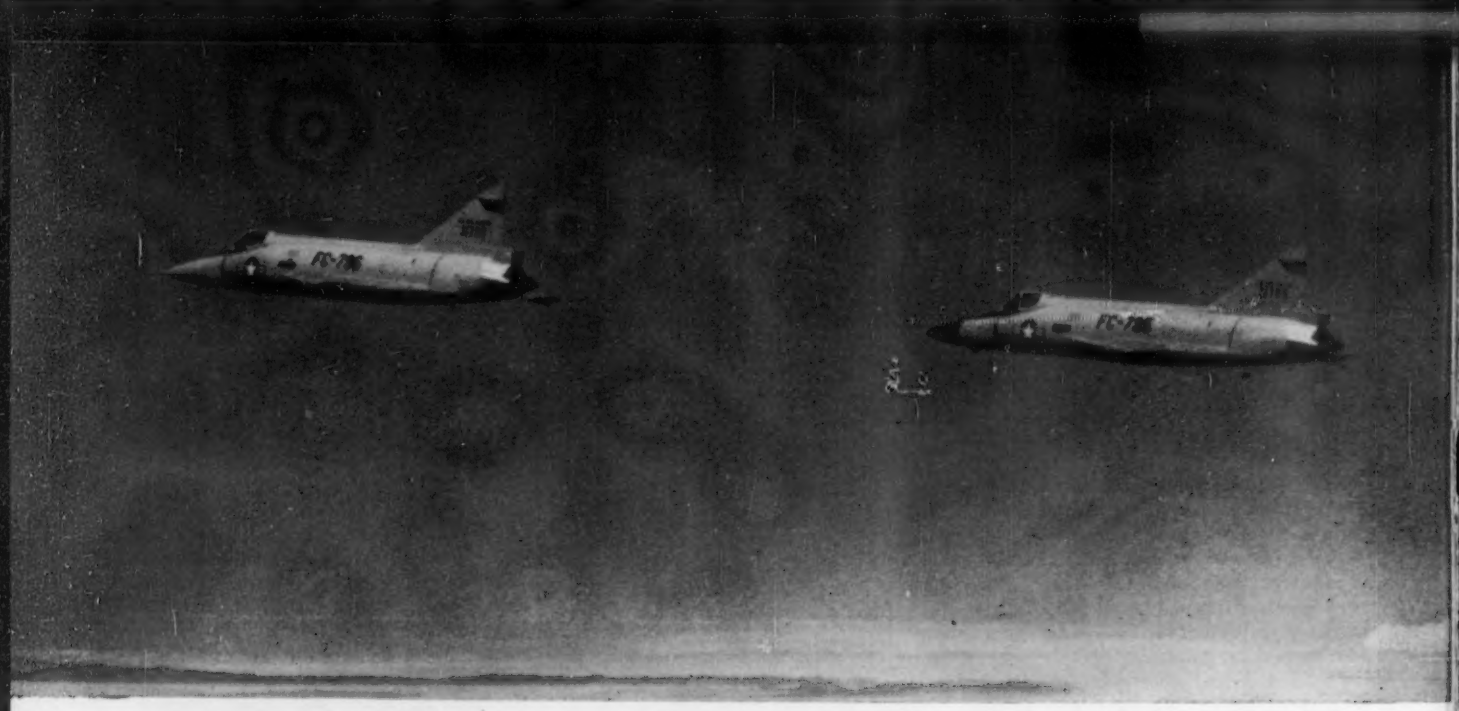
"While many of the larger companies already have large and competent staffs of technicians studying, devising and recommending automation programs, the smaller companies cannot afford the

USAF Saucer Project

In a terse announcement that it has a contract involving a new aircraft design concept with the Avro Aircraft Ltd., U. S. Air Force last week gave cautious confirmation to reports that it has taken over the Canadian flying saucer project.

Despite tight security wraps on the Avro plant at Malton, Ont., where the project prototype is located, it was reported that Lt. Gen. Donald L. Putt, USAF Deputy Chief of Staff for Development, has visited the site.

Air Research and Development Command took over the development after the Canadian government had spent only $397,000 on the design. This followed an estimate by Canadian Defense Production Minister C. D. Howe that construction of a prototype will cost $100 million.



THESE SUPERSONIC F-102As, first of their class to join the Air Force, are shown (above and below) in their initial formation flights over Southern California. USAF has announced three production orders for the Convair delta-wing, all-weather interceptors.

luxury of such departments."

Wishart, however, said he is optimistic that automation-equipment manufacturers will develop a line of semi-standardized equipment which can meet the "common denominator requirements" of hundreds of small and medium-size firms. This, he said, would enable such firms to benefit from a certain amount of automation without tailoring the equipment to its specific needs.

Wishart also suggested that companies might look into reducing the cost and price of their existing products, via automation, rather than spending the money on product diversification which is popular throughout industry today.

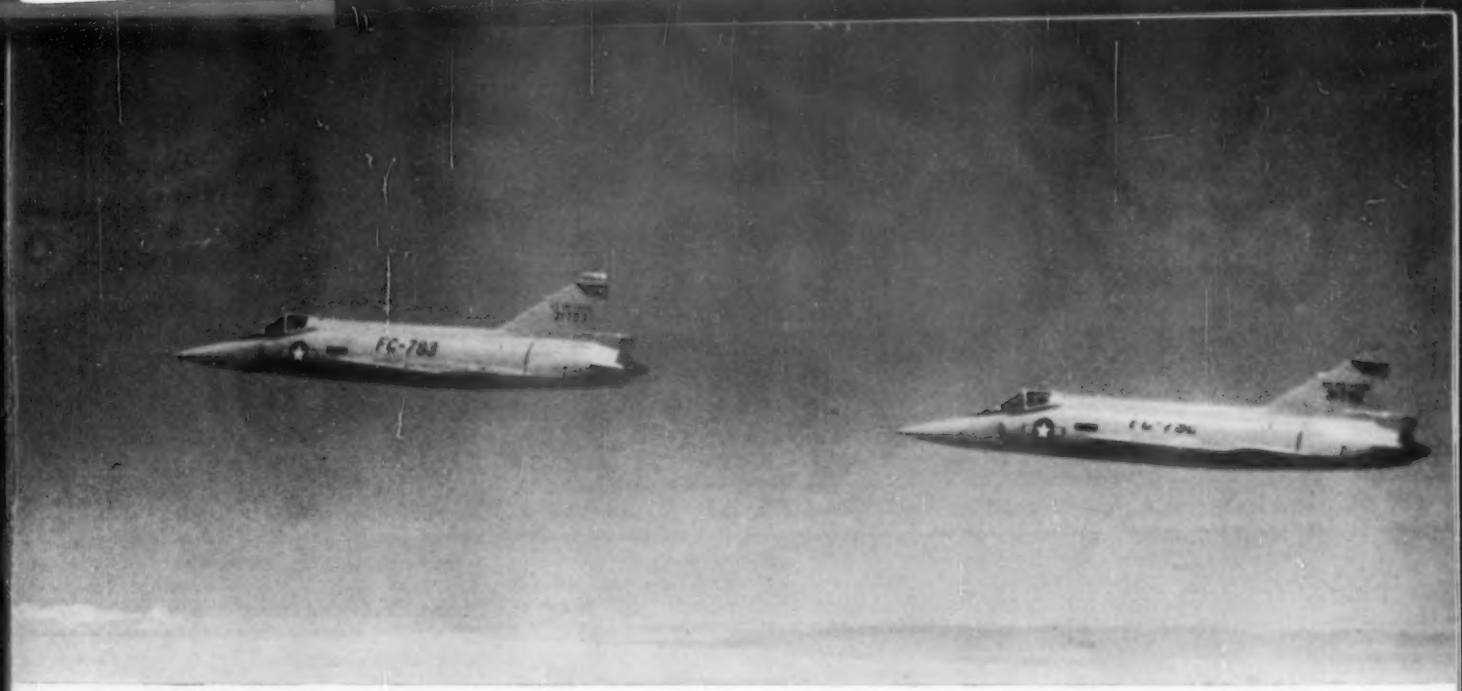
Rear Adm. F. R. Furth told the executives that the Navy is heavily engaged in investigating the uses of automatic electronic-data processing systems to improve the efficiency of its supply system and the effectiveness of its strategic planning. Furth is chief of the Office of Naval Research.

The Admiral reported that, through the use of a logistics computer, a research tool especially designed to handle supply problems, the Navy was able to solve in two days a problem involving types and grades of personnel required for establishing an advanced base. The problem, he said, would have required two months to solve through conventional procedures. A similar problem—determining the total materiel requirements for two Marine divisions—was calculated in three hours with the logistics computer as compared with several weeks previously required.

As a result of experience gained with its logistics computer, the Navy believes it can develop electronic-data processing systems specifically tailored to its problems which can be operated at one-third the cost of conventional electronic digital computers designed for general purpose use.

Adm. Furth said the use of electronic data processing machines also is expected to provide Navy inventory control and procurement centers with more speedy information on the day-to-day consumption and inventory of the thousands of military items which it must buy and stock.

Furth said that advantages which should accrue to the military services—as well as to industry and the nation as a whole—from the use of electronic-data processing systems include:



• **Speedy analysis** of the logistic implications of strategic plans and industrial capability to determine whether the nation can support such an operation. If one set of plans is beyond the nation's capability, another set can be quickly drawn and tested.

• **Smoother scheduling of production** and elimination of bottlenecks before they appear with consequent reduction of demands on transportation.

• **Reduced burden** on American industry, freeing more industrial capacity for civilian production.

• **Far fewer clerical employes** required by the military for stock and inventory control, freeing manpower to work in industry during war-time.

Convair Introduces 440 Transport

San Diego—Convair placed an improved airliner on the market last week —the Convair 440—a modified version of the present Convair 340. Its manufacturer claims it has the quietest passenger cabin of any transport in the world.

Scandinavian Airlines System was expected to place an order for eleven 440s late last week. Real Transportes S.A. of Brazil has ordered four. Other foreign orders are pending.

The company's decision to call the new airliner the 440 rather than the 340B was based upon the speed and sound improvements made over the 340s. Other specifications are the same.

Guaranteed boost in cruise speed of the 440 over the 340 is 5 mph., and it is likely that an additional speed increment may be available.

Improvements made to achieve the 5 mph. speed increase include:

• **Extended nose cowl** with smaller inlet area, improving cooling and reducing drag. Smaller inlet gives a high ram air velocity. Better nacelle fineness ratio reduces drag.

• **New baffling.** For additional improved cooling and reduced drag, Convair incorporated new engine cylinder baffles and cylinder head deflectors for the P&WA R2800 powerplant. This better performance is particularly important during climb or use of maximum continuous power.

• **Improved aerodynamic cleanliness.** The aft section of the engine nacelle has been reduced in size and more effectively blended into the adjacent wing area minimizing discontinuities in transition from nacelle to wing.

The dual augmentor tubes are eliminated, substituting in their stead a rectangular silencing muffler.

A sound improvement program (AW Mar. 28, p. 87) has resulted in a considerable reduction in speech interference.

Measured on an accoustical comfort index (proposed by Douglas Aircraft El Segundo Division's Lippert and Miller in 1951) ranging from minus 50 (extremely uncomfortable sound level) to plus 100 (ideal sound level), the standard Convair 340 passenger cabin rated about 45 for row 1 and about 15 for row 11 (last row). In the Convair 440, row 1 shows up as 75, while row 11 is about 60.

The exhaust silencer is the outstanding single item in the sound modification program. Another sound muffling development includes a special assembly for all windows. This consists of a rubber-supported floating inner window which seals against the outer window to give a fixed air space. Space is balanced to internal pressure and humidity by a plastic bladder which expands and contracts according to pressure differential. First four rows of seats have glass inner panes; the remainder are plexiglas.

Accoustical tape, a sound damping material known as Permacel Tape No. 12, is applied directly to the inside of the fuselage skin in varying thicknesses and according to pattern to afford maximum benefit with minimum weight.

Sound damping tape also is applied over ventilating ducts.

Ceiling, sidewalls, upper and lower sides of hatracks and ventilation ductsides facing the cabin interior are covered with an additional layer of Fiberglas.

A porous trim cloth in ceiling acts as sound barrier and deadener.

Improvements result in an estimated weight empty increase of 800-1000 lb.

To boost the takeoff gross and offset the increased empty weight, an improvement in flap performance has been incorporated. This improvement is accomplished by the addition of a wing trailing edge extension over the extended flap so that there is a converging effect on the airstream between the flap and the wing trailing edge.

This gives an improved lift coefficient for the wing, permitting a guaranteed takeoff gross of 49,000 lb. at CB17 power (wet takeoff with 2500 hp., using 115/145 fuel) or 47,900 lb. at CB16 power (wet takeoff with 2400 hp., using 100/130 fuel).

Helicopter Effective Life Saver In First Full-Scale Disaster Trial

Helicopters passed their first full-scale test under disaster conditions last week by operating successfully under the most adverse circumstances in the flood-stricken Northeastern U. S. according to an AVIATION WEEK survey of industry, civilian and military authorities.

Rushed in without advance warning, and often with a strange fuel in their tanks, helicopters prowled over waterlogged stretches of New England, Pennsylvania, Northern New York and New Jersey, saving many who otherwise would have drowned and picking up still others who, but for the helicopter, would have remained cut off for days. As one Civil Defense official summed up the helicopter's role: "If we didn't have (them), the number of lives lost probably would have been in the thousands instead of in the hundreds."

The mass helicopter operations, carried on from dawn to dusk with aircraft loaned by all the military services and by manufacturers located in or near the stricken areas, demonstrated these advantages:

- **New areas.** Many rescues were made at points heretofore inaccessible. People were picked up not only from isolated land areas but from trees, roof tops and from the flood currents. The hovering ability and sling mechanism of the aircraft were particularly helpful in these operations.
- **Adaptability.** Copters were flown in torrential rains and other adverse conditions which would have made flight by plane impossible. Some, unequipped with hoist mechanism, lowered ropes to effect rescues; others landed on small land formations.
- **Dependability.** Of an estimated 70 copters flying in the stricken areas, only two operational failures were reported. A Marine HRS crash-landed at Stafford Springs, Conn., and a Navy HUP was grounded in the Delaware River area, both with engine trouble.

The low-failure ratio was compiled even though many of the aircraft were forced to use 100 and 130 octane fuel instead of their normal 91/96 octane because of a shortage of the latter.

Duties performed included:

- **Rescue work.**
- **Aerial photography** and reconnaissance.
- **Air-lifting** emergency generators and other hospital equipment.
- **Supplying bread, water,** foodstuffs, medical supplies and water purification tablets.
- **Transporting troops,** rescue and survey personnel.
- **Laying telephone cables.**

Helicopters from nearby bases of each of the armed forces were despatched to threatened areas early on August 19 as the waters began to rise. Control centers were established at Johnsville, Pa., for the Delaware River area and at Bradley Field, Windsor Locks, Conn., for the Massachusetts-Connecticut region.

Brig. Gen. G. R. Stanley, of the Air National Guard, was in command at the Connecticut field. Some 50 military and private aircraft were in use in that area at the peak of evacuations. Commander C. H. Franklin, U.S.N., coordinated the helicopter operations at Johnsville.

Navy-operated HO4S, with single rotor, a crew of 2 and 8 passengers, and HUPs, with single engine, tandem rotor and internally operated rescue hoist, saw action in both areas. H-19s, USAF versions of the HO4S, H-21s, twin rotor, 14 passenger "Workhorse," and H-25s, counterpart of the HUP, were also operated by Army, Air Force and Air National Guard units over both disaster zones.

Marine Corps HRS, single-rotor, 8-passenger vehicles, and Coast Guard HO4S-2Gs were in use in the New England area.

Industry observers were outspoken in their praise of the helicopter's accomplishments in "the largest mass rescue by air." One spokesman said: "This proves conclusively that if we had extensive helicopter operations—airlines, industrial and military—it would be invaluable in emergency situations.

"They (helicopters) can go anywhere under any conditions."

Nonsked Fights on Two Fronts

Faced with new battles on the economic front, North American Airlines has gone to the U. S. Court of Appeals in its continuing legal fight to stay in business.

The nonscheduled operator has asked the court to reverse the Civil Aeronautics Board action which would put it out of business. The carrier has also asked the court to stay effectiveness of the CAB order (AW July 11, p. 107) while it is under judicial review.

While the legal process continues, North American and other irregular operators are faced with a new competitive threat in the form of fare cuts made by the transcontinental trunk airlines. The new fares, which go into effect in mid-September on Trans World Airlines, United Air Lines and American Airlines, are virtually identical to North American's $160 round-trip fare between major East Coast and West Coast cities.

North American Airlines said last week that competition with the schedules and equipment of the three trunk carriers at the same fare is virtually impossible for the irregular carriers which offer most of their service in DC-4 equipment. Most trunkline coach service is on DC-6 and Constellation equipment.

North American can continue to compete with the trunks with its DC-6B flights, according to a company spokesman. The carrier has two DC-6Bs and is in the market for more.

Aircoach Transport Assn. President H. B. Johnston credited nonscheduled airlines with promoting the fare cuts and said that "a permanent independent airline industry is essential to keep airline rates from going up."

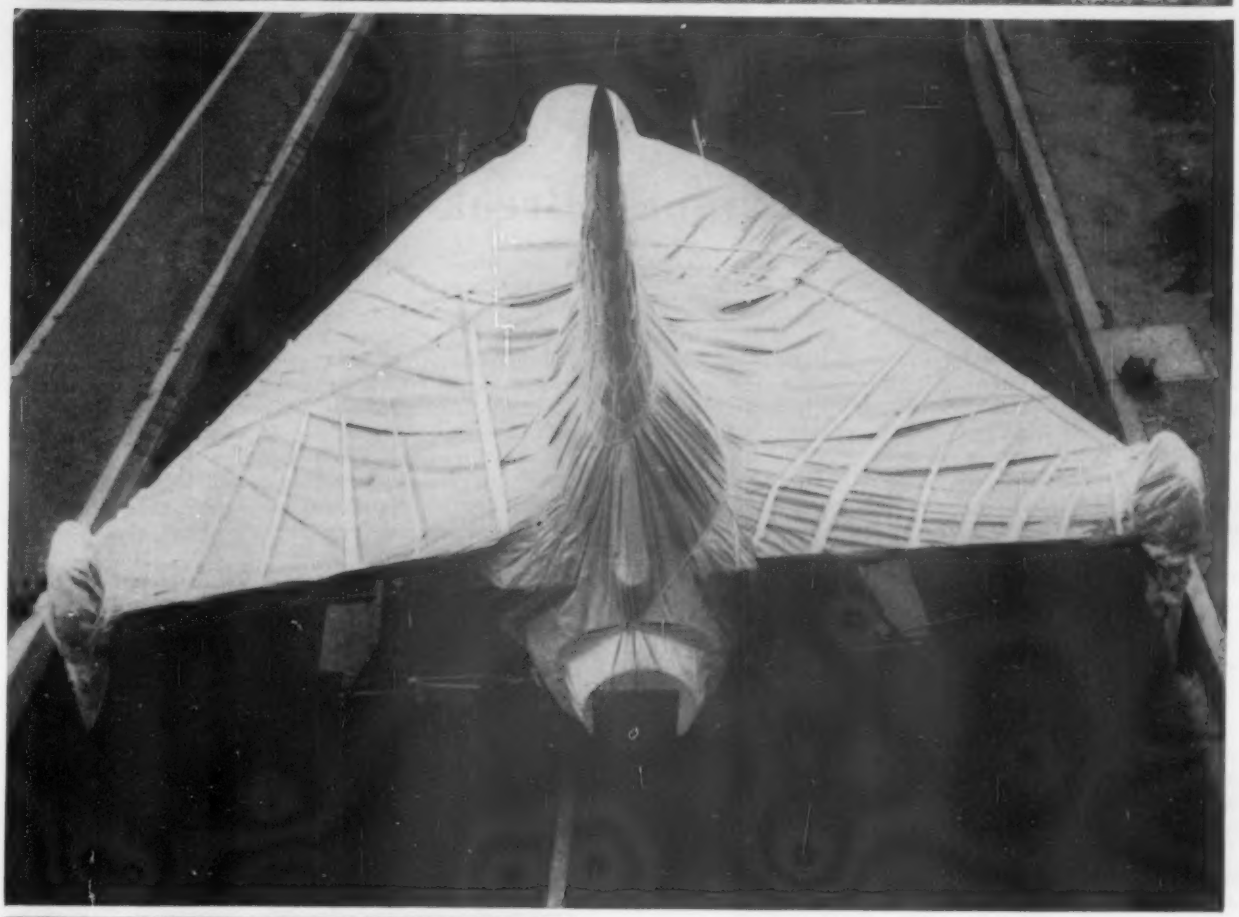
In its petition to the U. S. Court of Appeals for the District of Columbia, North American challenged the findings of CAB in its order. The carrier told the Court that the regulations applied to irregular carriers by CAB are invalid. In its brief, North American alleges that CAB adopted its regulations with the purpose of making irregular operations economically impossible, thus forcing the carriers to quit operating or be subject to enforcement action.

North American has also asked the court to stay effectiveness of order while the matter is under review. The carrier asks the stay to enable it to stay in business while the Court is reaching a decision and while CAB is considering various North American applications for a certificate.

New TWA Traffic Bid

Trans World Airlines made a second surprise move in the rapidly developing battle for transcontinental traffic by applying to the Civil Aeronautics Board for permission to operate nonstop coast-to-coast aircoach service. TWA wants to start operating a combination tourist-first class nonstop service with Super-G Constellation equipment Sept. 25.

The nonstop tourist plan follows closely TWA's fare cut to $80 for transcontinental coach service. American Airlines and United Air Lines have filed identical $80 excursion fares, and Northwest Airlines has cut its coach fares between New York and Washington and Portland and Seattle to $80 providing the ticket is sold as part of a roundtrip international fare.



Ryan XF-109 Design Highlights

With outlines poorly concealed by a canvas covering, Ryan's XF-109 vertical-takeoff fighter prototype moves from San Diego to Edwards AFB for flight testing.

Noticeable design features include the high delta wing with rounded center section, a deep, short fuselage and high triangular tail which serves also as one support pad for takeoff. Two other pads are built into the vertical structures at the wingtips. Unusual concentric exhaust nozzle of the Rolls-Royce Avon turbojet hints at the possibility of thrust augmentation or control during the vertical takeoff operation. XF-109 is third VTOL known to be turbojet-powered.

USAF Orders Faster Evaluation Of Missiles to Speed Integration

Washington, D. C.—U. S. Air Force has taken official cognizance of its tardiness in integration of the guided missile into its air arsenal.

In a new regulation (AFR 58-1) calling for faster evaluation of combat effectiveness "to determine the extent to which missiles can be profitably integrated into the Air Force," USAF's Chief of Staff, Gen. Nathan F. Twining, has now ordered a program that is designed to exploit their capabilities to the fullest.

"Manned aircraft techniques have, of necessity, been the basis in the past for most of the development practices and planning for the use of missiles," the regulation says. "Reluctance to depart from such development practices and planning procedures may prevent maximum progress."

To overcome this deficiency, the regulation orders integration of missiles with manned aircraft to "achieve operational capabilities as soon as possible."

There will be no waiting for the industry to produce test quantities. Strategic Air Command, Tactical Air Command and Air Defense Command are ordered to get under way with operational exercises while the new weapons still are in the research and development stage.

The commands will set up a limited number of guided missile operational units to produce data that will speed their integration.

USAF finds these advantages:

- **They can be concealed and dispersed** to reduce vulnerability before they are used.
- **They fly so high and fast** that it is difficult to hit them with any existing weapon while in flight.
- **Automatic guidance systems** now have "acceptable accuracy."
- **They can be brought** into action quickly in case of attack.
- **Range is sufficient** for offensive and defensive operations.

Results of the experimental work by the new operational units will result in a comparative evaluation of guided missiles and manned aircraft, the regulation says.

The regulation is careful not to freeze the mission of any missile. It makes these observations about three different types:

- **Missiles for strategic bombing** will be operated mainly from fixed launching sites against fixed targets. Major goal is to get them into action quickly in case of emergency and keep firing at a high rate.
- **Missiles for tactical bombing** will have guidance systems that provide maximum flexibility in shifting from one target to another. Some tactical missiles may be used for reconnaissance.
- **Air defense missiles** must have long shelf life, be capable of fast launching, high speed and hit a fast-moving target.

The regulation calls for faster development of missile capabilities with emphasis on planning and programming for production, provision of equipment and training.

British IGY Plans

British scientists recently announced plans to explore the upper atmosphere by launching rockets from high altitude balloons sometime within the next three years.

The experiment said to be much less expensive than the American "satellite" method, will be conducted at the Woomera, Australia, testing site as part of the Anglo-Australian program for the International Geophysical Year during 1957 and 1958.

The plan is to send a small, instrument-crammed rocket-powered by solid rather than liquid fuel—to a height of approximately 70,000 ft. attached to a large balloon. Radio-firing of the rocket from this point is expected to propel it to 300,000 ft., some sixty miles high.

The British also are considering launching rockets from Antarctica to test electric charges in the atmosphere over that territory.

Titanium 'Break-Through' Near

Washington, D. C.—A new "breakthrough" in research and development which could greatly accelerate the demands of the aircraft industry for titanium "is closer than has been supposed," a staff study by the special Senate Subcommittee on Minerals and Materials claimed last week.

"It definitely appears that research and development programs promise shortly to develop titanium alloys with physical properties superior to those presently required by the aeronautical industry," the report stated. It is based on a series of off-the-record conferences during April and June with representatives of aircraft and engine firms, the Department of Defense, Office of Defense Mobilization and the titanium industry.

The aircraft industry, Defense Department and Air Force were criticized. Calling on the Aircraft Industries Assn. to formulate an energetic program to make known the aircraft industry needs for the manufacture of improved military aircraft, the report said that, at the time of the conference, AIA "had not even taken a look at the titanium situation for six or eight months."

The Defense Department has failed to take "a strong enough lead," the report added, and in government agencies there is "a maze of red tape, routing and timidity."

A contributing factor to the lack of coordination and direction in the titanium program, the report declared, has been "vacillation and an apparent spirit of 'let George do it,' within the Air Force itself, as administered by Secretary of the Air Force Harold Talbott."

The report quoted these findings by experts of one airframe manufacturer:

- **"Great strides** have been made in melting and fabricating titanium within the past six months."
- **"Most of the technical data** regarding titanium in company files which is more than six months old is in the main unreliable."
- **"Titanium in mill forms,** forged and extruded shapes, with satisfactory physical properties is now available for order."
- **"The state of the titanium** fabricating art at their own plant level was inadequate, misleading and obsolete until quite recently."
- **"Titanium alloys** with physical properties exceeding present requirements for airframe use are in the laboratory stage and will be available for production use in the near future."

The study urged that "every effort" be made toward reducing the cost of titanium sponge and effectuating greater scrap recovery. It commented that "it seems probable that a substantial decrease in cost may only be accomplished through the development of radically different processes such as the production of titanium powder or metal on a continuous scale rather than by batch production." The report urged substantial government aid to fabricators in envolving new methods, as well as to producers of primary titanium.

Failure in the communication of know-how, the study declared, is another major bottleneck. "Each company seems to have solved certain practical problems on the shop level with which other companies still are wrestling," it commented.

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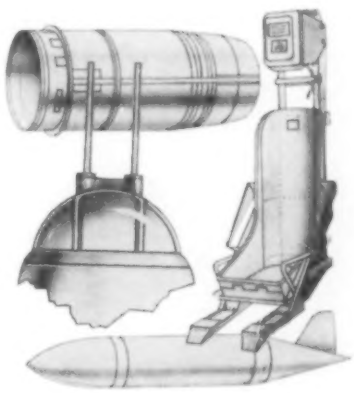
Rheem's Government Products Division facilities are presently in quality development and production on air frames, missile and jet-engine components, airborne ordnance, electronics and ordnance materiel.



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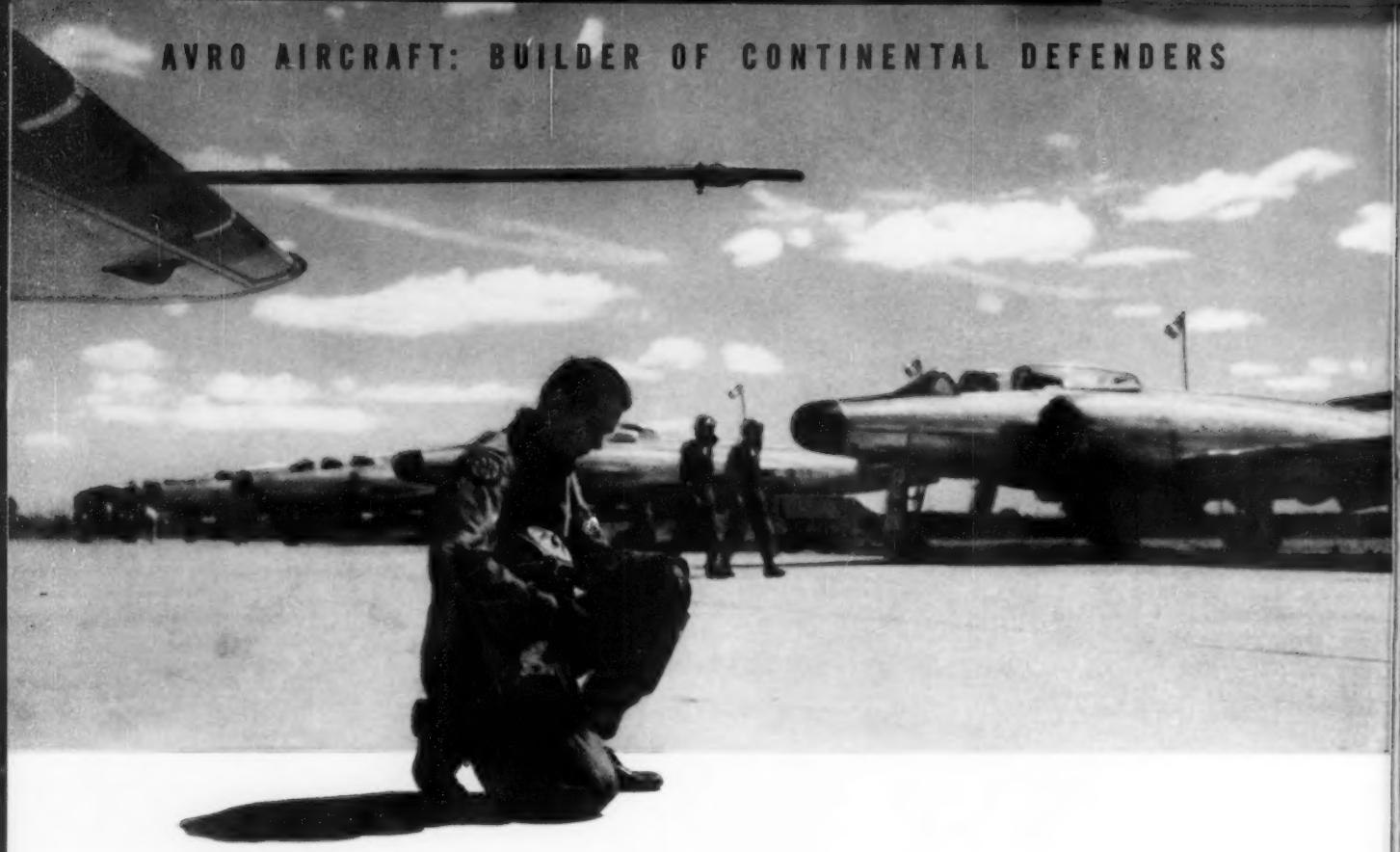
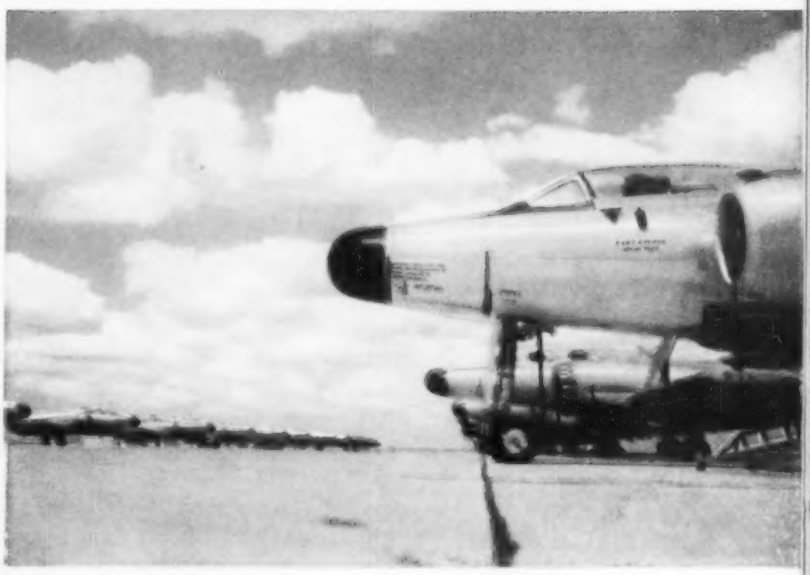
AVRO AIRCRAFT: BUILDER OF CONTINENTAL DEFENDERS



FLIGHT LEADER CHECKS HIS LOG

In the deadly serious business of guarding the northern approaches to Canada and the Western Hemisphere against enemy air attack, RCAF pilots and navigators function as a perfectly coordinated team. On that team, too, are the operation's officer, navigation chief, armament officer, radio control officer and ground crew. Backing up this team are the men at Avro Aircraft. For it is their job to design and build planes capable of meeting and repelling attack, if attack should come. This constantly expanding objective is being met by Avro Aircraft's extensive engineering division led by the most outstanding research, design and development engineers in the aeronautical industry. Powered by twin Orendas, no other all-weather interceptor in service today can equal the CF-100 for power and range.



In England, CF-100s are undergoing evaluation tests with the RAF. RCAF squadrons of CF-100s will begin duty with NATO forces in Europe by 1956.

AVRO AIRCRAFT LIMITED MALTON, CANADA

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National Aircraft Show Awaits Record Crowd at Philadelphia

Philadelphia is getting ready for the biggest National Aircraft Show in history. Speculation is that as many as 750,000 persons will visit the show at International Airport Sept. 3-5. The 1954 display at Dayton, Ohio, drew 200,000 viewers.

The aircraft industry and the Defense Department are co-operating to present both static and flying demonstrations of the latest advances in aircraft and equipment.

The big advantage of Philadelphia over previous midwest sites such as Dayton and Cleveland is that it is in the heart of the most densely populated area of the nation.

Show sponsors expect this year's events will draw visitors from New York and New England to points south of Washington. While the population is far more concentrated in this area, it is also true that the northeast is less air-minded than other parts of the country.

Many industrial participants, as well as the Defense Department, hope the show will help popularize aviation in this industrial region.

It was the Pentagon that shifted the scene through its ruling of a year ago that it would continue participation only if the National Aircraft show moved to another part of the country.

Philadelphia officials claim they are taking proper steps to control traffic to and from International Airport. The city has sufficient hotel accommodations, overcoming one of the major objections to Dayton as a site for the show.

Air Show Events

U. S. Air Force will continue to lead the military services in the extent of participation. In addition to more than 200 aircraft taking part in aerial and static demonstrations, pilots and F-100C Super Sabres of the Tactical Air Command will monopolize the Bendix Trophy speed race on Sept. 3, opening day of the show.

The TAC pilots will start their run this year from George AFB, Victorville, Calif., 2,325 statute miles from Philadelphia.

Their goal will be to beat the present record of 652 mph. set by Lt. Col. Robert R. Scott in an F-84F Thunderstreak on a flight from Los Angeles to New York last Mar. 9.

Previous Bendix race record was set last year by Capt. Edward Kenny of the Air Training Command, who flew an F-84F from Edwards AFB, Calif., to Dayton at 616 mph. This year's plane, the F-100, holds the official world speed record of 755 mph. over a 15-kilometer course.

Other major events:

- **Thompson Trophy** event will be a speed run by an F-100C Super Sabre over a straight 15 kilometer course. The test will be simulated at Philadelphia and the actual run made at Palmdale, Calif., with the results announced at the show.
- **General Electric Cross Country Trophy** event will be a transcontinental speed dash by B-47 Strato-jets from March AFB, Calif., to Philadelphia. It will be held Sept. 4. Pilots from the Strategic Air Command will participate. The event is a departure from previous GE trophy races, which have been held over a closed course.
- **The Allison Trophy** will be awarded to the USAF crew that wins a jet engine change contest. Abandoning the speed trials entirely, the prize for 1955 will be awarded to the maintenance crew that can set the fastest time for installing a new power unit in a Lockheed T-33 jet trainer. Engine is the Allison J33. The contest will be held Sept. 4.

USAF also will show:

- **The Thunderbirds**, acrobatic jet precision flying team.
- **Release of an Republic F-84F** from the belly of a Convair B-36 bomber.
- **Aerial refueling of Boeing B-47** bomber.
- **Two planes** making their first public appearance, the McDonnell F-101 Voodoo and Lockheed C-130 Hercules.
- **North American F-86D** demonstrat-

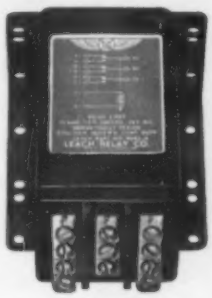
Rules of the Air

Philadelphia—Weather limitations set for USAF participation in the National Aircraft Show are a minimum ceiling of 2,500 ft. and five mi. visibility. This will apply not only to the scene of the 1955 demonstration but also to the scattered bases from which participating aircraft will depart.

None of the aircraft will carry live ammunition and external fuel tanks will be safetied so that they cannot be dropped by accident. A Grumman SA-16 and Sikorsky H-19 helicopter will stand by for emergencies.

Safety rules have been promulgated by Brig. Gen. Ralph O. Brownfield, coordinating officer for the Defense Department.

Leach RELAYS ARE Marked for Life WITH Metal-Cal



Field-tested Leach Precision Relays like this hermetically-sealed 400 cycle aircraft relay undergo rugged usage and it is essential that the precision schematic lettering remain easy to read and bonded for life to the relay—and Leach has standardized on one method of identification—Metal-Cal—the ultimate in labeling.

Metal-Cals come in a variety of colors—matte or shiny finish—any size or shape.

Metal-Cals adhere permanently to any smooth surface—flat or curved—without screws or rivets.

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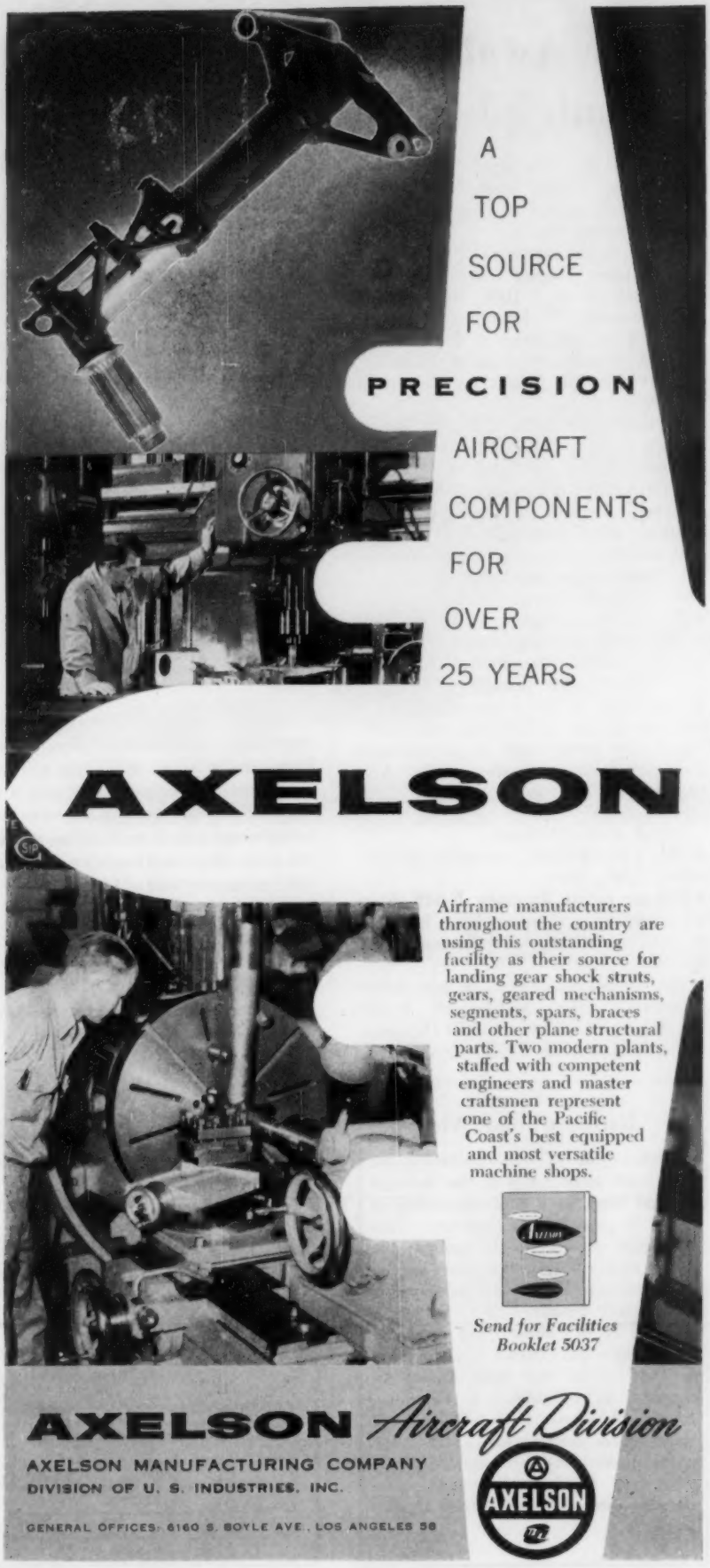
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ing high-speed climb with afterburner.

- **Simulated low-level attack** by Martin B-57 bombers.
- **Simulated interception** by Lockheed F-94C all-weather fighter.
- **Aerial review** including the Northrop F-89 Scorpion, F-84F Thunderstreak, F-86F Sabre and Lockheed RC-121 radar picket plane.
- **Six ground displays** including 22 air craft and demonstrations of USAF equipment.

Navy To Send Carrier

Featuring U.S. Navy participation will be the aircraft carrier Ticonderoga, anchored at a pier near the airport, on the Delaware River. The ship will be open to the public each day from 9 to 11:30 a.m. and planes will be launched from the catapault to take part in the air show.

Three flying units of the U.S. Marines will take part in the show. From the Ticonderoga's deck they will catapault the McDonnell F2H-4 Banshee and land before the crowd, using the Morest field arresting gear. Their program also will include a helicopter assault operation carried out from the carrier deck to the airport, where the Marines will be given simulated air support and cover by Grumman F9F-8 Cougar fighters.

Marine Flyby

The Marines will stage a flyby of all their operation aircraft. The new portable dome hangars will be used on the field to house static exhibits.

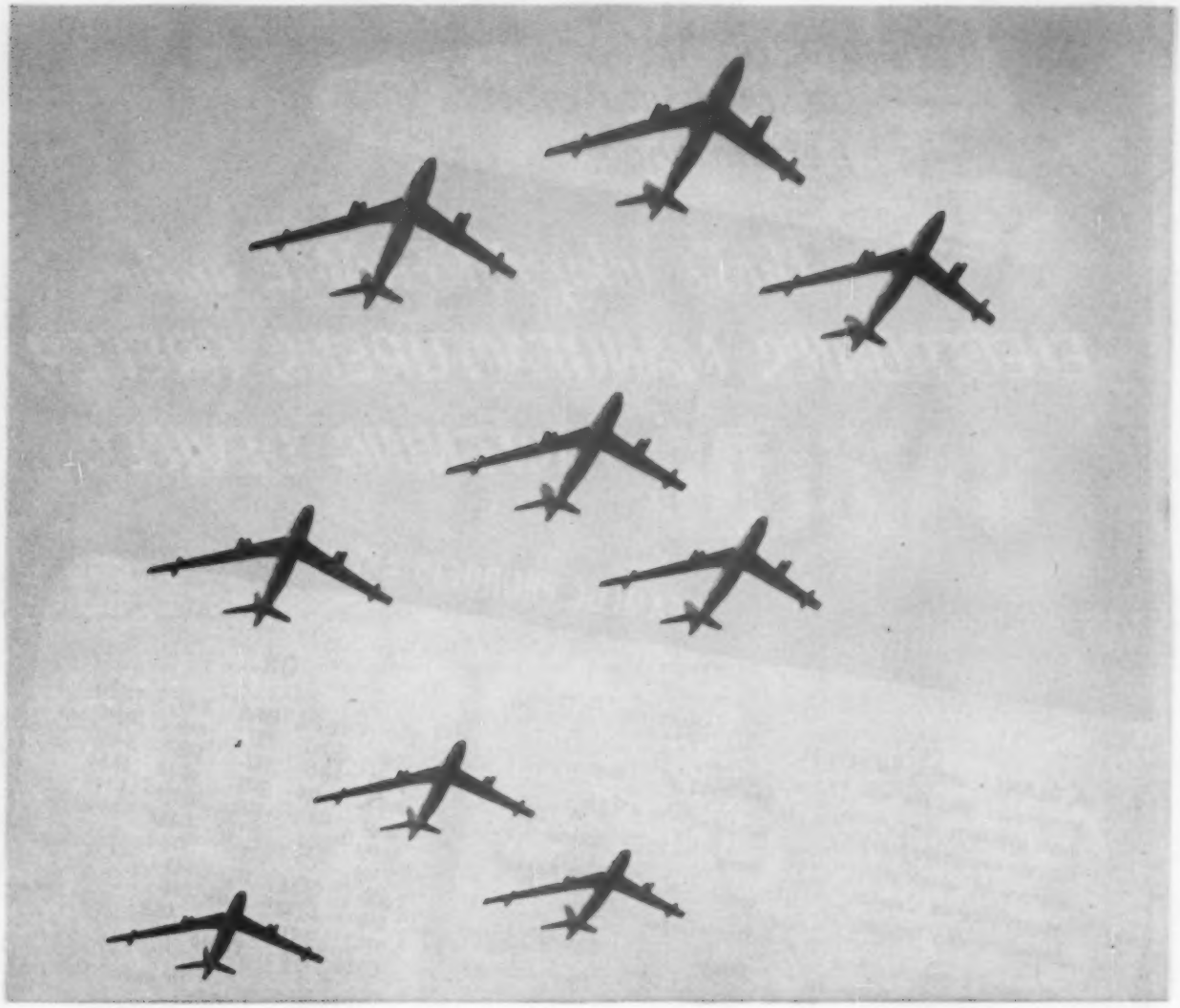
Navy's contribution will include 16 missions flown by currently operational aircraft. The list was not complete last week and a Pentagon Navy spokesman said he was not sure all types would be represented. Among possible features was a demonstration of how boundary layer control improves aircraft performance, a refueling demonstration and flybys of Navy planes and a dirigible.

Highlight of the Navy program will be an appearance of the Blue Angels, precision acrobatic team.

U.S. Army aviation plans an exhibition of how it uses both planes and helicopters similar to last year's Dayton performance. Top billing goes to the helicopter square dance, autorotational landings and a simulated battle problem. Latter will include a river crossing, wirelaying, medical excavation, resupply and simulated atomic artillery explosion.

Sabres to South Africa

Canada, Inc., sold 34 Mark VI Sabres to the Union of South Africa's Air Force. Value of the order totaled approximately $10 million.



Flying close formation

THE formation of Air Power calls for close teamwork – among plane builders as well as pilots.

No single aircraft or missile is produced in its entirety by one manufacturer.

This boils down to the one basic point we wish to make: It is *teamwork*—and the versatility of Goodyear Aircraft Corporation – which account for the capable manner in which this organization serves our many customers throughout the aeronautics industry.

We produce components for virtually every plane that flies.

We employ thousands of skilled workers to the task – and one out of every six is an engineer.

These men are specialists in their fields: plastics, metallurgy, electronics, adhesives, structures, aerodynamics.

They have pioneered new lightweight structural materials, new welding techniques, systems for guiding missiles, new laminated and transparent plastics – the new ways of helping to keep America first in the air.

The things they build run the gamut of flight – from metal fuel tanks, cockpit canopies, radomes, radar structures, missile boosters, fuselage shells to complete airships.

These things are hallmarks of teamwork; these things they do as prideful members of aeronautic's team.

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Federal Telephone
General Electric
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Hughes
I.B.M.
Lockheed
North American
Philco
Piasecki
Piper
R.C.A.
Republic
Sikorsky
Western Electric
Westinghouse

ON...

B-47, DC-6, C-123, P2V-7, RB-66, 1649A, F-104, A3D, 340, XFY-1, C-124, KC-135, F-102, F-84F, F-100, F7U, B-52, DC-7, C-135, C-130, H-21, F8U, F9F-8, 707, 717, B-36, B-58, TF102, T29, XF2Y-1, R3Y-1, 240, C-131D, B-66, A4D, F4D-1, DC-6B, C-132, C-133, F3D-2, AD-4, AD-5, AD-6, F11F-1, F-94C, F-107, RF-84, F-105, H-25A, S-55, S-56, S-59, T-37

188 Electra
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310 Cessna
PA23 Apache
J71 Jet engine
J47 Jet engine
AVQ-10 electronic units
RDR-1 electronic units
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Regulus missile

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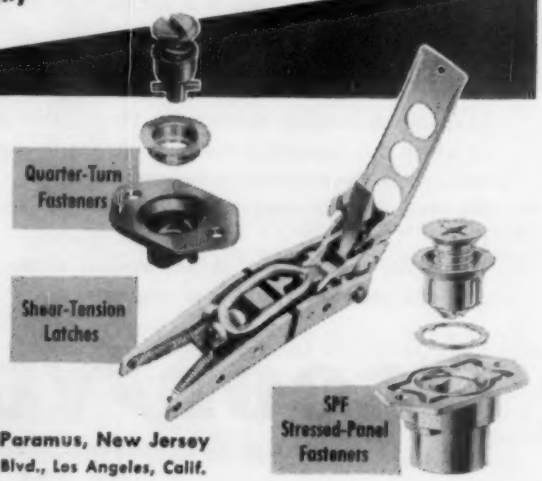

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Government's Airport-by-Airport Distribution of $20 Million Fund

Federal grants totaling $20 million for 205 communities have been awarded by the Commerce Department in the first allotments of the fiscal 1956 Federal airport aid program.

Programming of another $42,500,000 authorized for this year (AW Aug. 16, p. 124) is expected to be completed within the next three months.

The program includes $14,737,500 which was apportioned to the states under the statutory area-population formula and $4,912,500 assigned to high priority projects from the discretionary fund. Alaska, Hawaii, Puerto Rico and the Virgin Islands received the remaining $350,000.

An airport-by-airport breakdown of the $20 million appropriation follows:

ALABAMA

Decatur & Athens Pryor Airport	$ 22,500
Huntsville and Madison County Municipal Airport	40,000
Bates Field, Mobile	65,000

ARIZONA

Flagstaff Municipal Airport	$ 34,540
Tucson Municipal Airport	278,592
Phoenix Sky Harbor Municipal Airport	204,432

ARKANSAS

Fort Smith Municipal Airport	$ 30,000
Adams Field, Little Rock	142,000
Texarkana Municipal Airport	46,000

CALIFORNIA

Buchanan Field, Concord	$ 13,390
Fresno Air Terminal	200,000
Long Beach Municipal Airport	100,000
Los Angeles International Airport	269,224
Merced Municipal Airport	54,210
Modesto Municipal Airport	180,000
Oakland International Airport	300,000
Ontario International Airport	104,389
Riverside Municipal Airport	17,998
Lindbergh Field, San Diego	97,838
San Diego County Gillespie Field	78,865
San Francisco International Airport	81,315
San Jose Municipal Airport	124,008
Orange County Airport, Santa Anna	18,973
Stockton Field, Stockton	78,876

COLORADO

Montezuma County Airport, Cortez	$ 22,790
Stapleton Field, Denver	105,800
Pueblo Municipal Airport	185,000

CONNECTICUT

Danbury Municipal Airport	$ 17,000
Meriden Municipal Airport	14,000
Bradley Field, Windsor Locks	90,646

DELAWARE

New Castle County Airport, Wilmington	$ 23,231

FLORIDA

Meacham Field, Key West	$ 85,000
Orlando Municipal Airport	15,000
Fannin Field, Panama City	21,790
Pinellas County International Airport, St. Petersburg	20,000
Hillsborough County International Airport, Tampa	185,000

GEORGIA

Albany & Dougherty County Municipal Airport	$ 35,000
Clarke County Municipal Airport, Athens	6,000
Fulton County Airport, Atlanta	42,000
Malcolm McKinnon Airport, Brunswick	14,000
Travis Field, Savannah	30,000

IDAHO

Idaho Falls Municipal Airport	$217,928

ILLINOIS

Cairo Municipal Airport	$ 40,000
Chicago's O'Hare International Airport	300,000
Chicago Midway Airport	20,000
Peoria Airport Authority Municipal Airport	219,000
Quincy Baldwin Field, Quincy	25,000
Rockford Municipal Airport	42,000

INDIANA

Weir Cook Municipal Airport, Indianapolis	$215,000
Marion Municipal Airport	71,000
St. Joseph County Airport, South Bend	45,000

IOWA

Clinton Municipal Airport	$ 5,680
Des Moines Municipal Airport	43,113
Dubuque Municipal Airport	10,246
Estherville Municipal Airport	10,750
Fort Dodge Municipal Airport	17,000
Iowa City Municipal Airport	9,600
Waterloo Municipal Airport	11,250

KANSAS

Chanute Municipal Airport	$ 55,000
Lawrence Municipal Airport	125,000
Phillip Billard Airport, Topeka	41,300

KENTUCKY

Greater Cincinnati Airport, Covington	$168,393
Blue Grass Field, Lexington	53,000
Barkley Field, Louisville	200,475
Barkley Field, Paducah	25,000

LOUISIANA

Moisant International Airport, New Orleans	$265,923
Shreveport Downtown Airport	6,000

MAINE

Bar Harbor Municipal Airport	$ 22,000
Caribou Municipal Airport	17,275
Portland Municipal Airport	28,250

MARYLAND

Baltimore Friendship International Airport	$157,024

MASSACHUSETTS

Beverly John Mountan Airport	$ 7,250
Logan International Airport, Boston	300,000
Lawrence Municipal Airport	177,500
Norwood Memorial Airport	9,000

MICHIGAN

Escanaba Municipal Airport	$ 50,000
Kent County Airport, Grand Rapids	150,000
Ford Airport, Iron Mountain	40,000
Gogebic County Airport, Ironwood	25,000
Kalamazoo Municipal Airport	25,000
Capital City Airport, Lansing	125,000
Menominee County Airport	20,000
Muskegon County Airport	50,000
Pontiac Municipal Airport	30,000

MINNESOTA

Eveleth-Virginia Municipal Airport	$ 65,000
Grand Rapids Municipal Airport	61,900
Worthington Municipal Airport	85,000

MISSISSIPPI

Greenville Municipal Airport	$ 30,000
University of Mississippi Airport, Oxford	100,000

MISSOURI

Columbia Municipal Airport	$ 23,500
Joplin Municipal Airport	180,000
Kansas City Municipal Airport	300,000
Lambert-St. Louis Municipal Airport	300,000
St. Louis Meramec Valley Airport	100,000
Springfield Municipal Airport	30,000

MONTANA

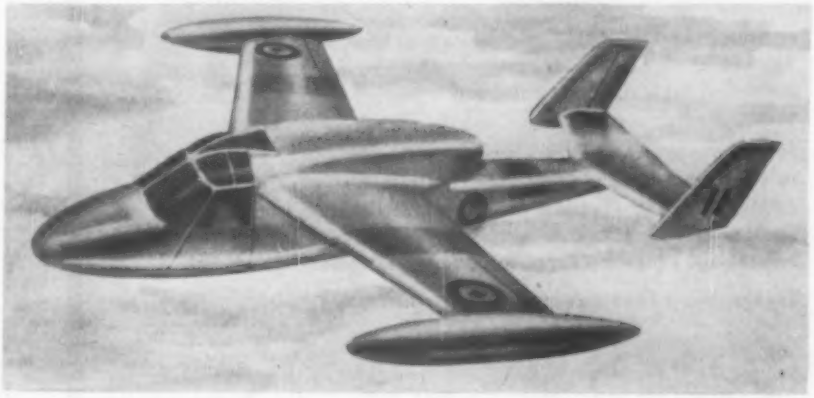
Billings Municipal Airport	$ 42,768
Butte Municipal Airport	87,410
Great Falls Municipal Airport	6,000

NEBRASKA

Alliance Municipal Airport	$ 25,000
Beatrice Municipal Airport	9,000
Chadron Municipal Airport	50,000
Columbus Municipal Airport	18,004
Hastings Municipal Airport	24,000
Kimball Municipal Airport	20,000
McCook Municipal Airport	25,000
Omaha Municipal Airport	75,000
Thedford Municipal Airport	16,000

NEVADA

Elko Municipal Airport	$ 32,268
McCarran Field, Las Vegas	87,500



New Miles Jet Trainer

New two-seat side-by-side all-metal jet trainer shown here is the Miles M.100 Student, designed to RAF training standards. The plane can also be used as a four-seater for liaison duties. The prototype, which is reported to be half completed at the F. G. Miles works at Shoreham, Sussex, Great Britain, carries a single Blackburn-Turbomeca Marbore 2 of 880-lb. thrust. An alternate power arrangement calls for two 350-lb.-thrust Palas engines. Top speed is given as 300 mph., maximum endurance 3 hr., normal gross weight 3,100 lb. Wing span is 28 ft., length 27 ft., height 6.25 ft. This illustration is reproduced from an advertisement in The Aeroplane, which says the actual prototype differs from the artist's version in having dihedral on the tail

Reno Municipal Airport	175,912

NEW HAMPSHIRE

Dillant-Hopkins Airport, Keene	$ 28,000
Lebanon Municipal Airport	24,631

NEW JERSEY

Newark Airport	$300,000
Mercer County Airport, Trenton	150,000

NEW MEXICO

Farmington Municipal Airport	$ 32,667
Hobbs-Lea County Airport	12,437
Lovington-Lea County Airport	48,874
Santa Fe Municipal Airport	180,767

NEW YORK

Buffalo Municipal Airport	$300,000
Chemung County Airport, Elmira	12,500
Jamestown Municipal Airport	75,000
International Airport, New York	300,000
LaGuardia Airport	300,000
Niagara Falls Municipal Airport	20,000
Ogdensburg Municipal Airport	109,000
Rochester-Monroe County Airport	226,903
Saranac Lake Airport	65,000

NORTH CAROLINA

Asheville	$130,000
Raleigh-Durham Airport	115,000
Smith Reynolds Airport, Winston Salem	67,150

NORTH DAKOTA

Bismarck Municipal Airport	$ 30,100
Fargo Hector Airport	63,500
Grand Forks International Airport	50,000
Sloulin Field, Williston	25,000

OHIO

Akron Municipal Airport	$ 97,265
Cleveland Hopkins Airport	300,000
Port Columbus, Columbus	300,000
Dayton Municipal Airport	176,920
Scioto County Airport, Portsmouth	47,500

OKLAHOMA

Bartlesville Frank Phillips Airport	$ 25,000
Will Rogers Field, Oklahoma City	110,000
Tulsa Municipal Airport	100,000
Tulsa Municipal Airport No. 2	300,000

OREGON

Mahlon Sweet Airport, Eugene	$185,800
Medford Municipal Airport	34,500
Portland International Airport	300,000

PENNSYLVANIA

Port Erie	$105,000
State Airport, Harrisburg	50,000
Lancaster Municipal Airport	82,500
Philadelphia International Airport	300,000
Greater Pittsburgh Airport	122,500
Allegheny County Airport, Pittsburgh	100,000
Williamsport Municipal Airport	148,975
York Municipal Airport	200,000

RHODE ISLAND

T. F. Green Airport, Hillsgrove	$ 45,460

SOUTH CAROLINA

Anderson Municipal Airport	$ 47,500
Columbia Municipal Airport	28,000
Sumter Municipal Airport	31,000

SOUTH DAKOTA

Aberdeen Municipal Airport	$ 42,450
Lemmon Municipal Airport	13,265
Philip Municipal Airport	7,960
Rapid City Municipal Airport	22,550
Watertown Municipal Airport	5,700

TENNESSEE

Tri-City Airport, Bristol	$ 70,000
Lovell Field, Chattanooga	50,000
Memphis Municipal Airport	222,750
Berry Field, Nashville	25,000

TEXAS

Abilene Municipal Airport	$ 71,050
Robert Mueller Airport, Austin	269,000
Jefferson County Airport, Beaumont	241,048
Houston International Airport	245,000
Gregg County Airport, Longview-Kilgore	30,000
Lubbock Municipal Airport	125,000
McAllen Municipal Airport	9,000
Plainview and Hale County Airport	10,000
Mathis Field, San Angelo	40,000
San Antonio International Airport	300,000
Pounds Field, Tyler	30,000

UTAH

Moab Municipal Airport	$ 54,257
Salt Lake City Municipal Airport	203,088

VERMONT

Barre and Montpelier Municipal Airport	$ 31,000

VIRGINIA

Roanoke Municipal Airport	$ 30,000
Staunton Municipal Airport	250,000

WASHINGTON

Boeing Field, Seattle	$100,000
Seattle-Tacoma Airport	300,000
Yakima Municipal Airport	131,000

WEST VIRGINIA

Kanawha County Airport, Charleston	$ 37,375
Tri-State Airport, Huntington	161,000
Morgantown Municipal Airport	300,000
Wheeling-Ohio County Airport	95,000

WISCONSIN

Fond du Lac County Airport	$ 32,553
Kenosha Municipal Airport	131,500
General Mitchell Field, Milwaukee	161,000
Osceola Municipal Airport	16,280
Stevens Point Municipal Airport	14,000

WYOMING

Casper Air Terminal	$ 57,485
Cheyenne Municipal Airport	39,721
Newcastle Mondell Field	18,320
Powell Municipal Airport	55,477

ALASKA

Petersburg Seaplane Base	$ 75,000
Municipal Airport, Bethel	14,370

HAWAII

General Lyman Field, Hilo	$ 17,500
Honolulu International Airport	232,500
Molokai Airport, Kaunakakai	43,304

PUERTO RICO

San Juan International Airport	$100,000

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who co-pilots the F-100?

that's a good question—

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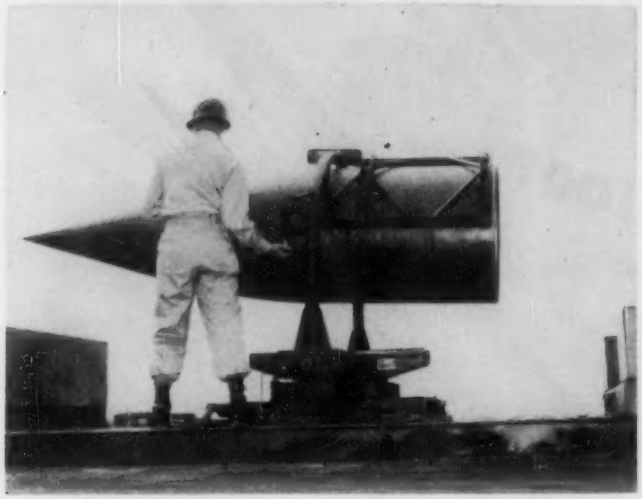


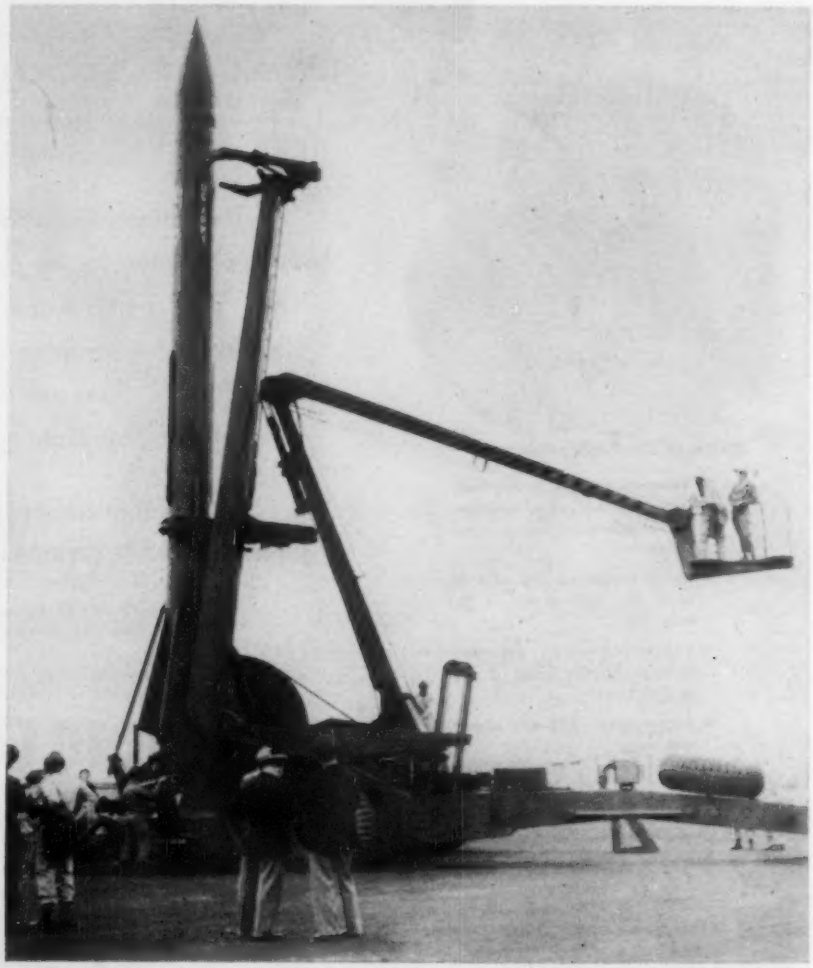
CORPORAL WARHEAD on truck gets check out by batallion officer.

MISSILE ERECTOR is remotely-controlled by technician at left.

U.S. Corporal Battalion Set to Go in

CORPORAL launching unit on its truck.

MISSILE locked in place aboard launcher.



WITH CORPORAL in vertical position, erector noses missile onto launcher ready for firing.

ERECTOR DRUM dwarfs men in background.

ERECTOR ARM moves towards vertical launching position with Corporal missile in tow.

Germany

By Gerald W. Schroder

Bonn—A recent field demonstration by U. S. Army Forces in West Germany of the first surface-to-surface missile unit to be assigned to a tactical army revealed hitherto undisclosed details.

The unit, the 259th Field Artillery Missile Battalion (Corporal), is under the command of Lt. Col. Glenn B. Elliott and stationed in the central part of West Germany within the 7th Army command.

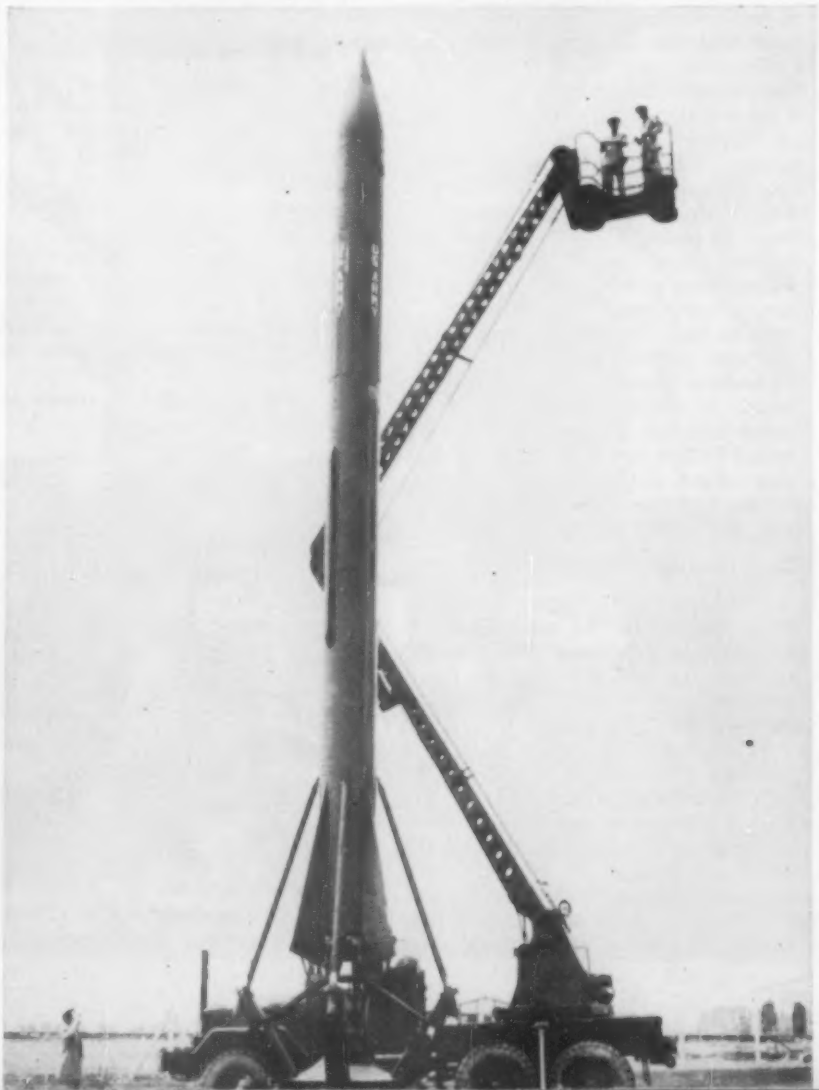
The 259th, which is made up of 500 highly skilled officers and men, arrived in Germany early this year after training in Ft. Bliss, Tex. Although the battalion has not actually fired the Corporal in Europe, it is expected that a test firing will take place soon. Suitable ranges are reported to exist on the continent, possibly in Germany itself.

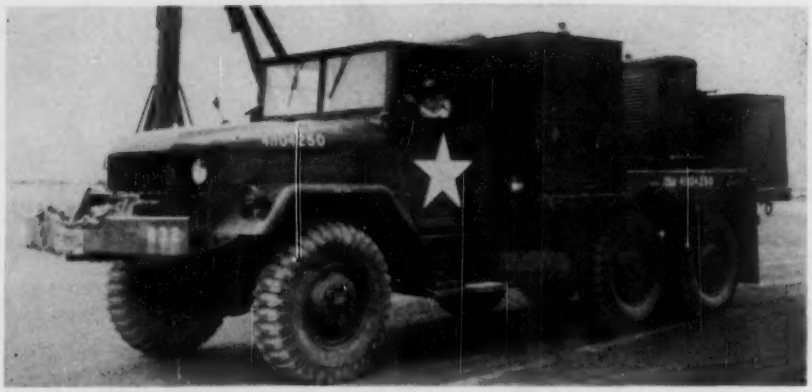
The assignment of the Corporal battalion to the 7th Army adds power "in excess of several thousand artillery rounds fired at the same time," AVIATION WEEK was told. The missile warhead can be atomic or conventional type.

The weapon's mission is to furnish tactical support to the field forces. It is handled like any other regular artillery weapon under the jurisdiction of the respective army tactical commander. Its striking force, range and capability make it the Army's major artillery support weapon. The battalion is completely mobile, a factor which increases its adaptability under combat conditions.

The battalion cannot be air lifted

MISSILE, set onto launcher by erector, is checked by officers riding inspection tower.





HEAVY-DUTY TRUCK carrying critical electronic equipment for Corporal missile.

at the present time, apparently because of the weight and size of the over-30-ton erector unit that sets the Corporal up for firing.

The Corporal's range is classified, but is known to be "in excess of 20 miles."

The Battalion

The Corporal battalion consists of a headquarters battery, which is the command unit and directs actual firing of the missile; a service battery, which is charged with initial supply and resupply of fuel, missiles, warheads and equipment, and two missile batteries.

Duties of the missile batteries are broken down this way:

- **Ammunition sections** receive the missile, uncrate it, fuel it, mate warhead to missile. All of this is done at the launching site.
- **Assembly, test and repair section** performs all preflight checks on electronic and fuel components.
- **Launching platoon** takes over in the next to last stage: it erects missile vertically on launcher, performs final go-no go checks and launches.
- **Guidance platoon** guides the airborne missile to target. Average IQ of the entire battalion is higher than that required for entrance into Officers Candidate School, and the Guidance Platoon has the highest number of college graduate and skilled technicians.

The Missile

The Corporal itself consists of three basic components: the warhead at the very tip, the propulsion system in the center section and, in the tail, the supersonic rocket motor which combines the fuels and builds up thrust.

Whether the warhead is to be conventional or atomic is determined by higher headquarters on the basis of the local situation and needs. Since the Corporal unit is part of the NATO forces, any decision to use an atomic warhead will come from NATO rather than from a subordinate headquarters. Day-to-day training is carried on along conventional warhead lines.

The missile and its warhead are shipped in separate containers. The missile, which comes in a pressurized "can," is drawn—along with all other components—from regular Army ordnance sources, such as ammunition dumps.

One ordnance ammunition company is the regular support unit for the battalion. Another ordnance company (direct support guided missile) supports the battalion in the maintenance and supply of items peculiar to the missile itself.

On the Firing Line

The demonstration "firing" of the Corporal witnessed by AVIATION WEEK included everything but the actual launching of the missile itself.

Here, within the limits of security regulations, are the steps leading to the launching:

- **Missile is removed** from pressurized can and placed on a set of rails—the "missile rail."
- **Assembly commences:** fins, antennas and other miscellaneous items are added.
- **Complete checkout** of electronic and propulsion units is run.

DRUMS OF ANILINE fuel for Corporal missile being towed onto launching site.

- **Missile is fueled** with aniline and red fuming nitric acid.
- **Warhead work** is performed and warhead gets complete checkout.
- **Missile is removed** from missile rail by the erector and placed on launcher.
- **Final overall missile check** is performed.
- **Corporal is launched.**

Details of actual fueling and launching procedures are highly classified, but it can be stated that an "airbottle truck," which is capable of storing air at pressures of 3,500 psi., forces air into the missile. At the go signal, the compressed air forces the aniline and red fuming nitric acid together and into the motor in the aft section.

The missile is guided by radar from launching to impact. The ground crews know at all times where it is and what it is doing.

Storage and maintenance problems are no better or worse than those of a normal artillery unit in the field, AVIATION WEEK was told. Although the equipment is heavy and in many respects complicated, the battalion is completely mobile and can operate regardless of weather conditions.

The Corporal has taken its place solidly as a normal artillery weapon in 7th Army thinking.

Engineer Salaries Show Slight Rise

Salaries for engineers and other professional employes are 4.5% higher this year than last, according to a survey just completed by the Executive Compensation Service of the American Management Assn.

Electrical and mechanical engineers rate tops in the salary survey. Median pay for these groups is $7,000. For chemical engineers it is $6,500; for industrial engineers $6,000. The average engineering beginner gets $4,500 upon reporting from a college campus.

The spread in salaries reported is "surprisingly narrow," AMA's study says, "considering the great demand for and short supply of professional personnel."

The study covered 20 engineering and professional job classifications in 19 industries among AMA's 21,000 members. The pay level for these positions was found to be about the same as that of production foremen. Salaries do not vary much with industries, company size or location for these positions but like those of foremen and "middle management" personnel tend to be similar for similar jobs.

However, only a fifth of the professional people got bonuses this year, compared with a fourth of the foremen and two-fifths of middle management executives.

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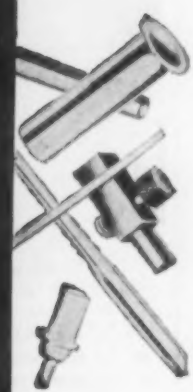

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MORE GET-UP-AND-GO FOR TAC COMBAT CARGO

USAF HERCULES

Every job assigned to the Tactical Air Command requires one special talent: mobility . . . more "get-up-and-go."

TAC's new combat cargo plane, the C-130 Hercules, represents a new era in mobility. It's the first military transport with turbo-prop power. It's fast—faster than many commercial transports. It's eager—able to take off and land in less than 300 yards. Designed for rugged and robust work, it can use even improvised runways.

First assignment for Hercules: providing a mobile airlift at a moment's notice for TAC's 18th Air Force. Hercules will fly cargo and men *farther, faster and at less cost* than any other combat transport. The job of quick resupply is a good example (and just one of Hercules' dozen or more prime missions). After dropping 64 paratroops, or landing supplies or 90 infantrymen in combat zones, the Hercules can hustle back to advance base, load up with some 20 tons of food, ammunition, medical supplies, and deliver them where front-line fighters need them. Then, converting in a matter of minutes to a hospital plane, a single Hercules can evacuate up to 74 litter patients.

This takes get-up-and-go. TAC's Hercules has it. Designed by Lockheed, the Hercules is now in production at Government Aircraft Plant No. 6 in Marietta, Ga., first U. S. turbo-prop production line for transports.

LOCKHEED AIRCRAFT CORPORATION, GEORGIA DIVISION, MARIETTA, GEORGIA

Italian Ariete Jet To Be Supersonic

Rome—The Ariete light fighter-interceptor prototype under construction by Aerfer in Naples will be capable of supersonic speeds, according to preliminary details released by the company.

The swept-wing jet has two engines, one an auxiliary to provide a reserve of speed and maneuvering ability. Armament, it is believed, will consist of rockets and bombs plus two 30-mm. cannon when the plane is used for tactical support. Length is a little over 30 ft., the wingspan, 24.5 ft., according to the Rome newspaper Il Tempo.

The Ariete design is a refinement of the Sagittario 2 light fighter built by Aerfer and will be followed by a series of seven later ships. Plans call for each succeeding model to incorporate lessons learned in the preceding ones.

Three Firms 'Lend' Ryan Skilled Help

Three aircraft firms in various parts of the country have "lent" Ryan Aeronautical Co., San Diego, 120 tool designers, engineers and jig and fixture builders to help in tooling up to construct large fuselage sections of the Boeing KC-135 jet tanker.

The men, all in critical job categories difficult to fill locally, will spend the remainder of the summer working on the tanker which requires the largest jigs in Ryan's history.

The contingents are from Lockheed Aircraft Co., Marietta Ga.; Boeing Airplane Co., Seattle and Wichita; and Jonco Aircraft Co., Shawnee, Okla.

ARDC Getting Big Flight Simulator Lab

An electronic testing and flight simulation laboratory, described by its builder as the largest and most modern in the U. S., is expected to begin operation within a year at Wright Air Development Center, Ohio. The Reeves Instrument Corp., Inc., of New York, will build the laboratory for the Air Research and Development Command.

The new center is designed for handling the specific problems involved in the development of weapon systems for the Air Force. Using computers, it will pre-evaluate the tactical feasibility of new designs. It will incorporate all of the most advanced electronic computer techniques, according to Reeves. The lab's computer will have more than 500 operational amplifiers which, with associated equipment, makes it larger, faster and more versatile than any of this country's other large-scale differential analyzers, a company spokesman said.

Among the innovations is a Reeves-developed system to check not only the problem but subsequent phases of computer performance. Multiple time scales are available, as are indications that computing components have been used in their optimum range, and typewriter keyboard devices for setting scale factors and arbitrary functions of several variables into the machine.

An automatic programmer permits operators to perform large numbers of runs without resetting controls or problem parameters. A patch-board verifier, developed by L. M. Warshawsky and W. G. Braun of WADC's Aeronautical

Reborn Spirit of St. Louis

The Spirit of St. Louis, most famous monoplane in the world, is flying again these days over Long Island.

Ship shown here being inspected by Charles Lindbergh is one of three constructed for filming of his Pulitzer Prize-winning book about the first solo trans-Atlantic crossing. It was rebuilt by Paul Mantz from a Ryan Brougham at a reported price of $40,000, using the blueprints prepared for the original plane. Brougham wings were extended 2.5 ft. on each side so span is 46 ft., same as on the original craft. Engine is a Whirlwind J5 turning a Hamilton Standard metal prop.

The movie model must be photographed from the right side only, as a pilot's position has been engineered into the nose on the left side (see picture) for the pilot who will actually fly the plane while "Lindbergh" (actor James Stewart) is photographed doing it. Lindbergh had to use a periscope to see forward in the original Spirit of St. Louis.

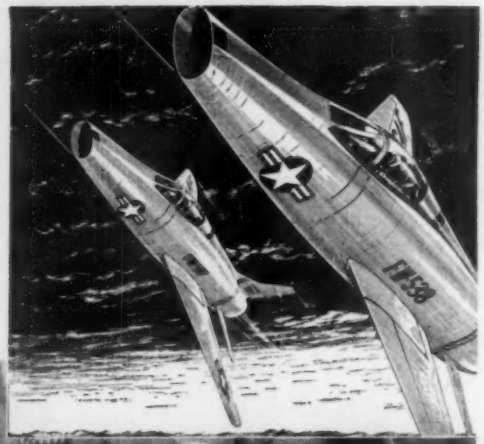
Mantz, who is handling the aerial photography, is also building one of the other replicas, and actor Stewart and Joe de Bona are building the third.

The camera crews had to wait for bad weather, duplicating the conditions of the original flight, for aerial photography over Long Island, New England and Nova Scotia. A major problem has been the anachronistic rooftop TV antennas, which spoil authenticity of air to ground shots. The movie company is building a new "Roosevelt Field" in Texas and "Le Bourget" near Paris for realism.

After filming is completed in this country, the replica will be air-freighted to Paris for French sequences.

A Moth Major, said to be the same plane that photographed Lindbergh's exploit for Pathe News, will play the same role in the picture. Mantz will work from a modified L-1.

Fast Filter Changes on the F-100 with Marman V-Band Coupling and Aeroquip Hose Lines



Here is an excellent example of how Marman clamps and Aeroquip hose lines work hand in hand to simplify aircraft plumbing installations:

On the North American F-100, a compact Marman stainless steel V-band coupling joins the fuel supply line to the filter. Utmost simplicity is achieved because *the clamp flange has been machined right on the Aeroquip special hose fitting!* The Marman "quick-coupler" latch adds quick assembly and disassembly advantages, and locks securely.

Marman clamps, straps, and couplings are used throughout the F-100 and many other planes for a wide variety of applications. Engineering assistance is available. Write for information.

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Research Lab, provides automatic digital verification of computer patching for particular problems and gives a printed record of machine setup. The computer detects its own malfunctions and pinpoints them for correction by the operator.

The large integrated computer will consist of four sections, which may be used separately or in any combination.

German Border Guard Buys First Helicopter

Bonn—Germany's crack Federal Border Guard has purchased and imported its first helicopter, a Hiller UH12B. The copter was purchased from Hiller through the Cologne firm of Luftfahrt-Technik GmbH.

The copter is now stationed at Bonn's Hangelar Airfield and will be used for a variety of purposes—border patrols, liaison and routine police work, traffic control and emergency investigations in accessible territory.

One pilot and one mechanic have been trained thus far by a Swiss instructor. A second pilot-mechanic team is now in process of training. Both pilots are ex-Luftwaffe pilots. The Border Guard is not planning purchase of additional helicopters in the "foreseeable future," however, since the unit's budget is limited.

Convair Studies Noise Effect on Materials

Convair-Ft. Worth is conducting research to determine the ultrasonic effects of jet engine noise and aerodynamic friction on aircraft materials.

The high frequency sound (20 kilocycles and up) is being studied for its effect on fuels, lubricants, hydraulic fluids, plastics, adhesives and on the explosive limits of fuel.

Test tube samples are immersed in a coupling fluid where they are submitted to radiation at the point of maximum energy. Energy absorption is evidenced by the release of dissolved gases, cavitation and its resultant geyser on the specimen surface and by a vapor above the liquid.

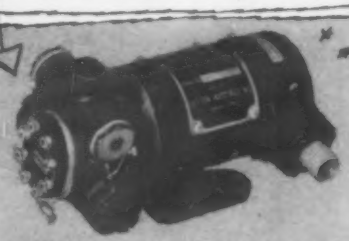
Tests are made on the samples before and after ultrasonic exposure to determine changes produced.

Italian Missiles

Italian guided missiles activity has gotten new impetus with granting of a license by Oerlikon, Swiss armament firm, to Centraves Italiana and award of study contracts by USAF to School of Air Engineering, Rome, for high-speed ballistics research.

SPECIAL AIRCRAFT PUMPS

Eastern Aircraft Pumps are extremely small in size and light in weight. They are built to meet all appropriate government requirements under exacting conditions.
Six series of Eastern pumps described are representative models from the entire range of Eastern units, and provide a wide choice of performance characteristics.
Special model pumps or completely new units can be custom-made to your project.



THE 1700 SERIES is the *smallest* and *lightest* line of pumps ever made for delivering a small, yet accurate, volume of fluid against high pressures while operating at high speeds. When close-coupled to high speed motors, the size of the motor and pump combination remains small and light in weight. They are designed to meet rigid military specifications governing aircraft installations. Listed are a few of the many special pumps tailored to meet special requirements.

THE 1200 SERIES was designed to meet the requirements for greater flow than the 1700 Series. The displacement of the smallest pump in this series is 0.0154 cubic inches per revolution. The largest pump has a displacement of 0.0769 cubic inches per revolution. This series operates satisfactorily between a temperature range of —65°F to +160°F. They handle pressures as high as 1,000 p.s.i. and can be driven at speeds up to 6,000 R.P.M.

THE 1100 SERIES has similar performance characteristics to the 1700 Series. The displacement of the smallest pump in this series is 0.00838 cubic inches per revolution.
1101-5 is flange-mounted pump. *1102-10B* is specially constructed of corrosion resistant materials; bronze housing, bronze gears, monel shafts, carbon bushings and synthetic rubber seals—designed to handle degreasing liquid.

THE 1400 SERIES Pumps are multi-element units of minimum weight and size designed to perform satisfactorily under severe conditions of low temperature and high altitude. These pumps have an aluminum housing, steel gears and shafts, synthetic rubber seals, and carbon bearings. The multi-element pumps are designed to meet requirements for scavenging and lubricating.

THE AR SERIES are commonly used as emergency stand-by fuel pumps. Motors are 1/50 H.P. aircraft type, 4500 R.P.M., available for 12 or 24 volt D.C. Size 6" x 4-¾" x 2-¾". Weight is approximately 2-¼ lbs. Pumps are constructed of aluminum, and have mechanical rotary seals.

THE 100 SERIES is a continuation of the 1200 Series for still greater flow requirements. The displacement of the smallest pump in this series is 0.104 cubic inches per revolution. The largest pump in this series has a displacement of 0.365 cubic inches per revolution. Operates between a temperature range of —65°F. to +160°F. and pressures up to 1800 p.s.i.g.; speeds up to 3450 R.P.M.

Eastern INDUSTRIES, INC.
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Write for Aviation Products Bulletin 330.

Solar-Bristol Join in Afterburner Pact

By Irving Stone

San Diego, Calif.—Bristol Aeroplane Co., Ltd., one of Britain's prime engine developers, is establishing itself in the afterburner field, building on a framework of wide design and production experience amassed by an American company, Solar Aircraft Co.

An agreement between Solar and Bristol covering afterburner development and licensing has just become effective, with approval by both the U. S. and British governments.

Contract involves approximately $1 million and will run for about eight years. Initially it is believed to involve afterburner development for engines in the Bristol Olympus series.

Under the agreement, Solar will:

- **Give its know-how** in design and production of afterburners to Bristol.
- **Design and build** several pre-prototype afterburners for extensive test stand runs at Bristol.
- **Assist Bristol** in its development work, starting with these pre-prototype afterburners, advising on modifications and any other phases of the Bristol program.
- **Deliver to Bristol** additional afterburners, controls and components in connection with the development program.
- **License Bristol** to use Solar's patents and proprietary designs relating to afterburners. In connection with the transfer of these rights, Solar will supply consultation service for a period of years.

Also, Bristol will be permitted the right of sub-license in the United Kingdom and in Europe, subject to Solar's approval. Guide to the latter condition will be obtainance of security clearance in this country.

Contract negotiations had been going on for more than a year.

Working on it for Bristol were Air Commodore F. R. Banks, technical director; Dr. Stanley G. Hooker, chief engineer; and A. J. Hunt, commercial services manager.

For Solar: Edmund T. Price, president and general manager; Herbert Kunzel, executive vice-president; Paul A. Pitt, chief engineer; and Patrick Johnson, manager of the company's European division.

All of the Bristol representatives visited Solar during the negotiations.

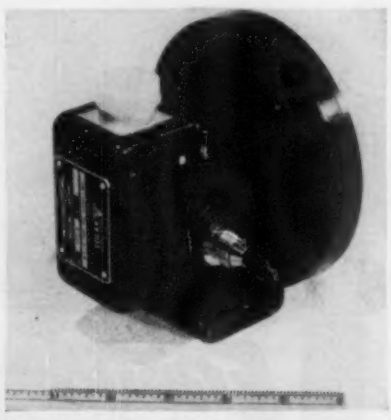
Bristol already has sent specifications to Solar on two engines. Bristol would like an afterburner designed so that it would be applicable to both powerplants—a difficult assignment, since even teaming one afterburner to different models of the same engine is no easy job.

OFFICIALS DISCUSS AFTERBURNER AGREEMENT—Solar representatives are Edmund T. Price, pres.-gen. mgr. (right) and Paul A. Pitt, chief engineer (left); from Bristol, Dr. Stanley G. Hooker, chief engineer (right center) and unidentified official.

While fitting this afterburner for a dual role will be an objective of the program, Bristol has been requested to specify which of the two powerplants the initial afterburner is to be specifically designed for, so that at least it will do a prime job for this engine.

Only broad principles of the design have been formulated thus far by Solar engineers. Further design aspects will be firmed soon—after the arrival at Solar of a Bristol liaison team, who will have to be cleared with the Air Force.

Specific design for the initial afterburner should be completed sometime this summer, allowing time for Bristol's revisions or approval.



MICROJET CONTROL, which automatically monitors engine pressure conditions, will be incorporated in Solar jet afterburner development for Bristol.

Work on the pre-prototypes will start immediately after design approval. American standard parts and materials will be used. It probably will be late fall before any afterburner is delivered to Bristol under the program.

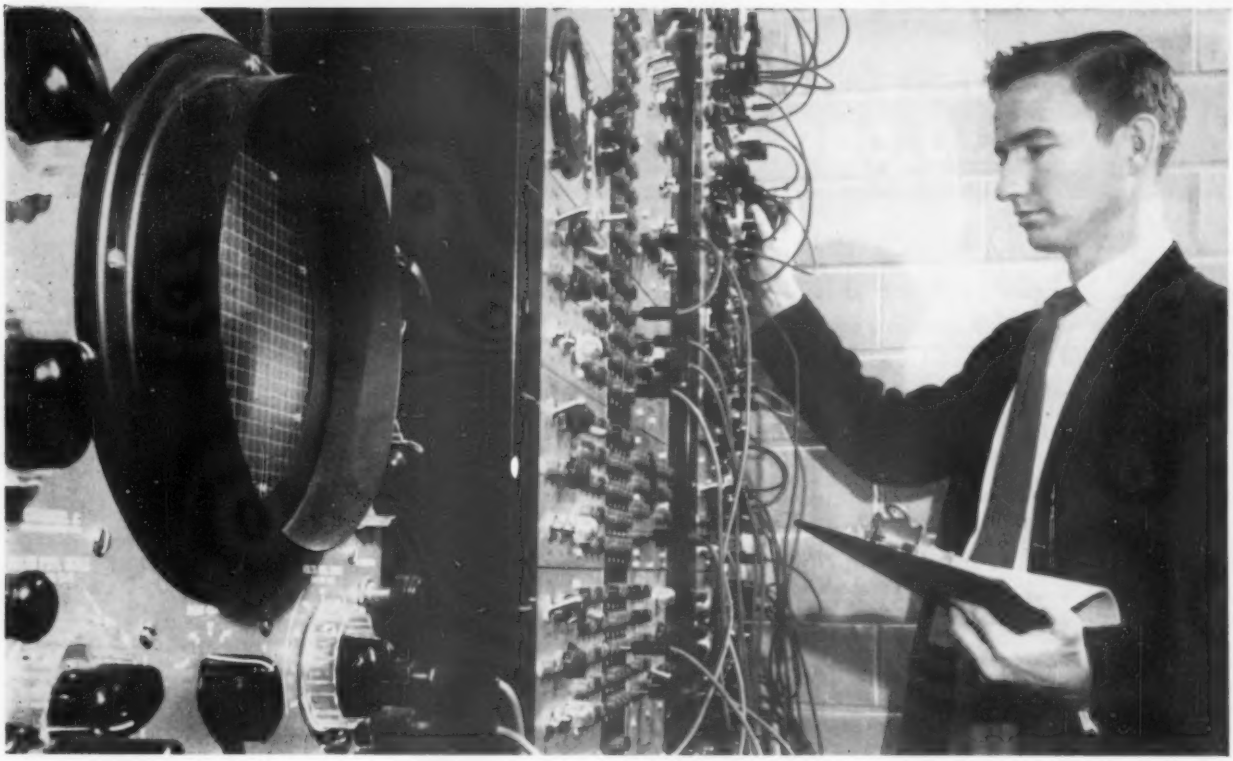
The afterburner development projected under the agreement will incorporate controls based on the Microjet system Solar has developed.

This is an automatic, pneumatically operated device which controls afterburner fuel flow and the variable nozzle in relation to the main engine for various flight conditions, AVIATION WEEK has learned. American engine builders who are using or have shown interest in, the device include Pratt & Whitney Aircraft, Westinghouse, Wright Aeronautical, General Electric and Allison.

Solar says Microjet "computes by itself under all flight conditions exactly what the turbine discharge pressure should be, and at the same time notes any error between the actual engine pressure and what it should be. If there is an error, the Microjet automatically sends out electrical signals to other engine controls which correct the pressure conditions."

In connection with the afterburner testing phase of the development program, Solar will have a technical team at Bristol. These representatives may remain there for at least a year.

It is Bristol's intention to become self-sufficient insofar as continuing de-



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  b) performance
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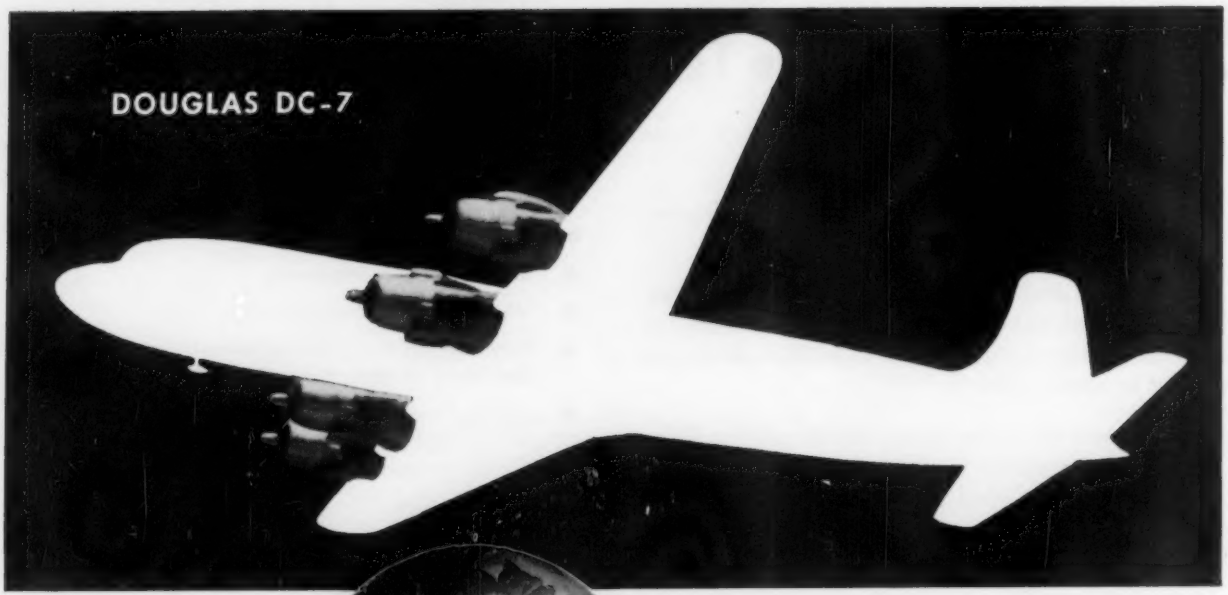

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*A trade name of Curtiss-Wright

BRISTOL commercial sales mgr., A. J. Hunt (left) and Solar exec. vice president, Herbert Kunzel, pose with afterburner.

velopment work is concerned, and it will absorb responsibilities as it goes along, relying on Solar's guidance in consultation.

Anything Solar learns as a result of the agreement—either from its own development contributions or from Bristol's work—may be applied to Solar's afterburner activity in this country.

Pioneer in the afterburner field, Solar has produced a total volume of these units with an aggregate value of more than $35 million.

Solar afterburners were the first to fly in both Navy and Air Force planes.

J46 Jet Production Resumes After Strike

Westinghouse Electric Corp.'s aircraft gas turbine plant in Kansas City has resumed operations after a nine-week strike which was settled with the signing of a new contract with the United Automobile workers (AW Aug. 22, p. 7).

An immediate wage increase was granted amounting to 6 cents an hour plus 3 cents for wage inequities in a three-year contract running until Nov. 1, 1958. A further increase of 6 cents and 3 cents is provided for on Nov. 1, 1956 and another increase of 6 cents and 1 cent a year later. The contract also includes a company paid pension plan, modified union shop, and other benefits.

Westinghouse is finishing orders for the J46 jet engine at the Kansas City plant as well as turning out spares and parts in support of engines already in the field. Conclusion of the strike has also permitted resumption of work on the $12.5 million research and development laboratory Westinghouse has under construction.

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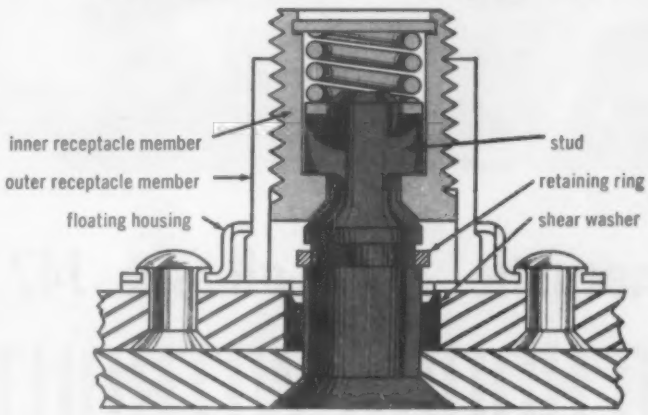

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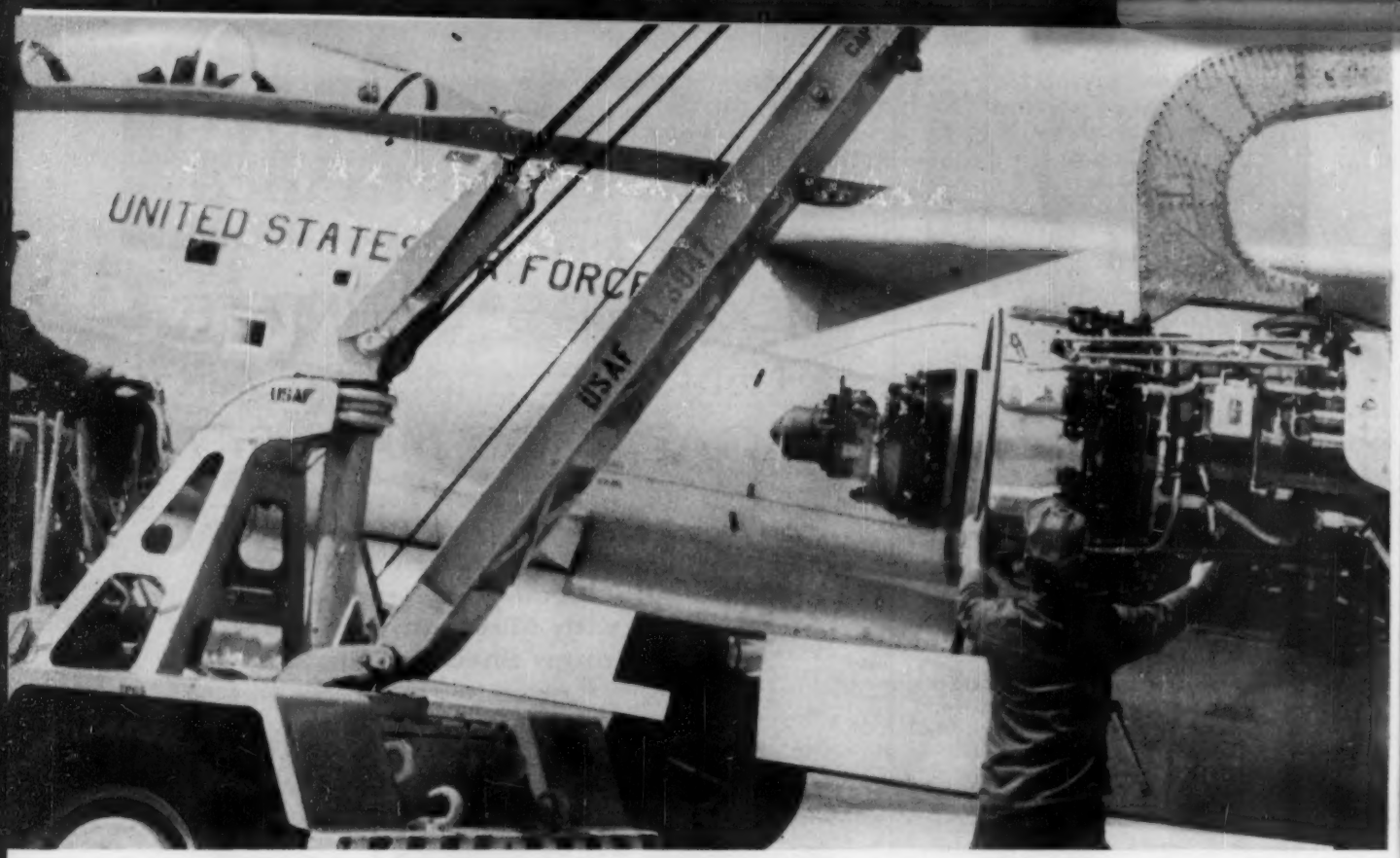

At Pinecastle AFB, all six J47's on B-47 pass

1000 HOURS WITHOUT OVERHAUL

Estimated 490,000 miles flown by each G-E engine installed on Boeing Stratojet No. 51-2076, part of SAC's 19th Bomb Wing

Setting the pace for the growing durability of American turbojets, all six General Electric J47-GE-23's installed on a SAC B-47B recently passed 1000 hours without overhaul at Pinecastle AFB, Orlando, Florida.

These rugged J47's, operational since November of 1952, went through 600 hour inspection over a year ago with only minor parts replacement. At last report, all engines had approximately 1010 hours. Since each hour was flown at an estimated airspeed of about 490 mph, total flight distance of the B-47B has been more than 20 times around the world.

Used today in the North American F-86 and B-45 as well as the B-47, hundreds of J47's are nearing the 1000 hour mark. As a result of their outstanding performance, the Air Force has saved more than $100 million through reduction in the total number of engines required. Since 1950, improved production methods in G-E jet plants have saved another $50 million.

The J47 *typifies* G.E.'s key role in U.S. air power. Right now, operating experience from this turbojet is paying off on still newer engines in G-E test cells and on the drawing boards.

232-1

Progress Is Our Most Important Product

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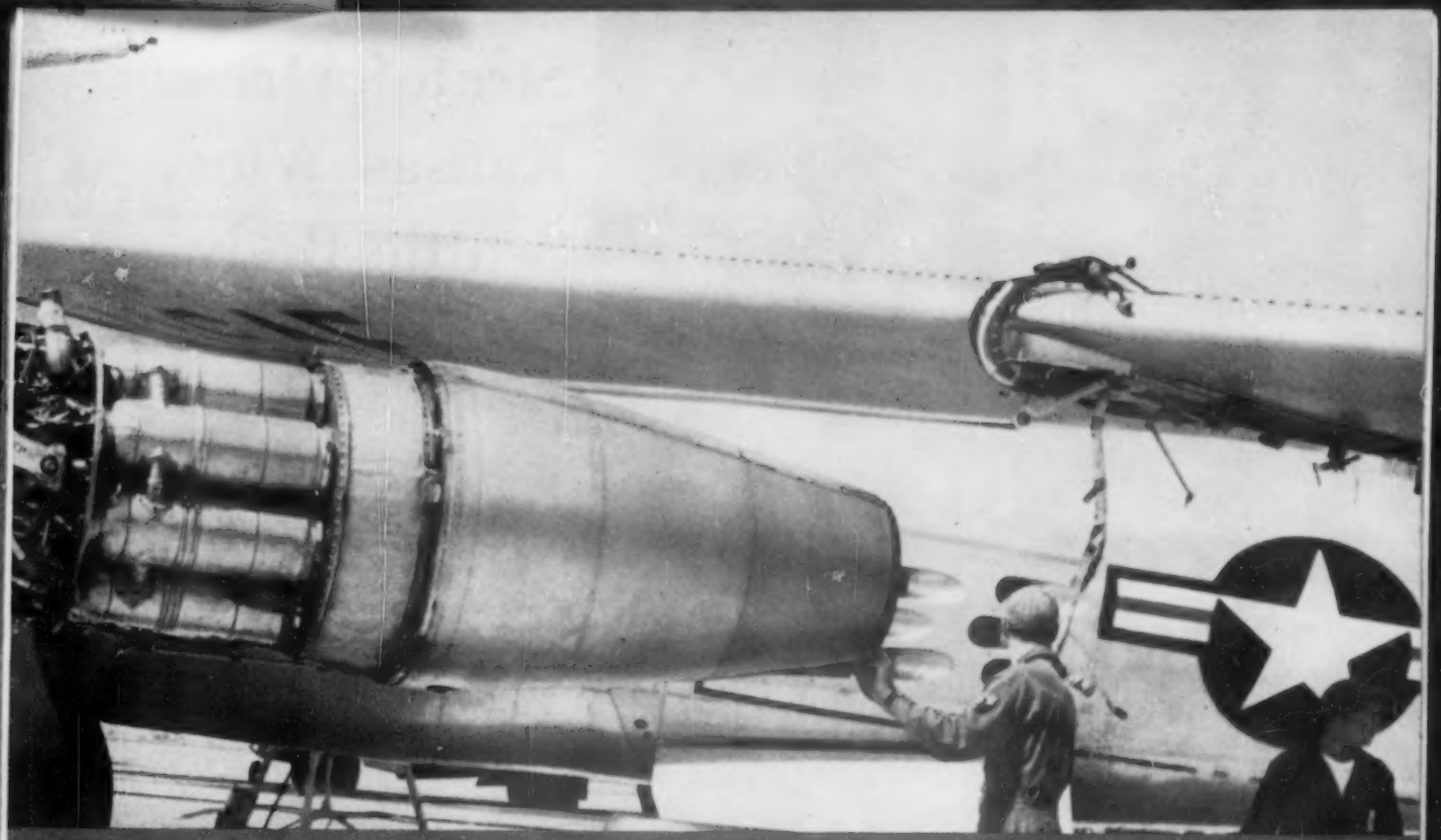
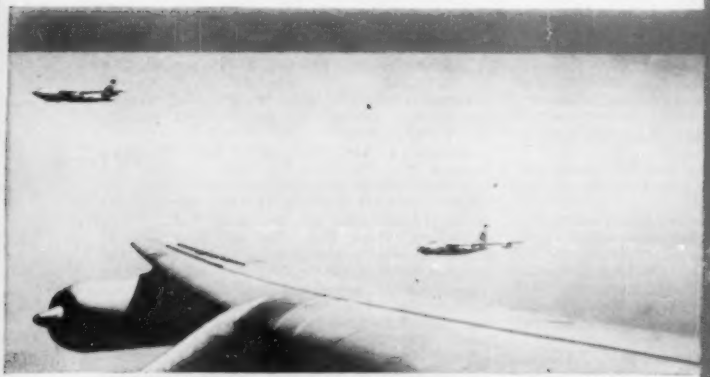


STRATOJET #51-2076 was built at Boeing's Wichita, Kansas, factory. The aircraft has been flying training missions for over 30 months, including the first non-stop transatlantic combat readiness mission undertaken by a SAC B-47 Wing.

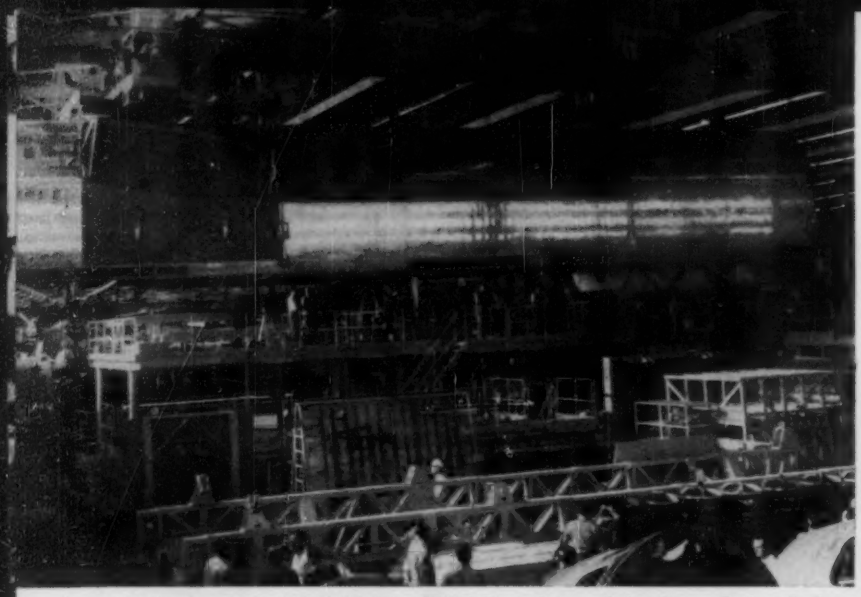
G-E TECH REPS who worked with SAC maintenance crews on the 1000 hr. B-47 are shown with the 19th Bomb Wing's Commanding Officer. From left to right, Superviser Bill Wallace; Col. V. M. Cloyd, Jr.; Walt Duggan.



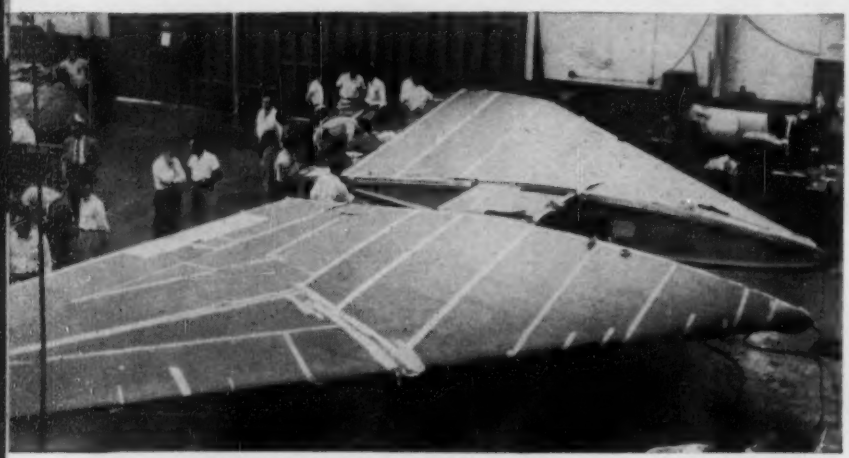
OVER 1000 B-47's at U.S. Air Force bases throughout the world, are now operational with SAC. In the past 7 years, G.E. has supplied four different engine models—the latest 50% more powerful than ship's original jets.

SAC's LOW J47 ENGINE CHANGE RATE stems largely from close teamwork of USAF maintenance crews and G-E field service engineers. This teamwork has helped to raise J47 allowable operating time between overhauls to 1200 hours.

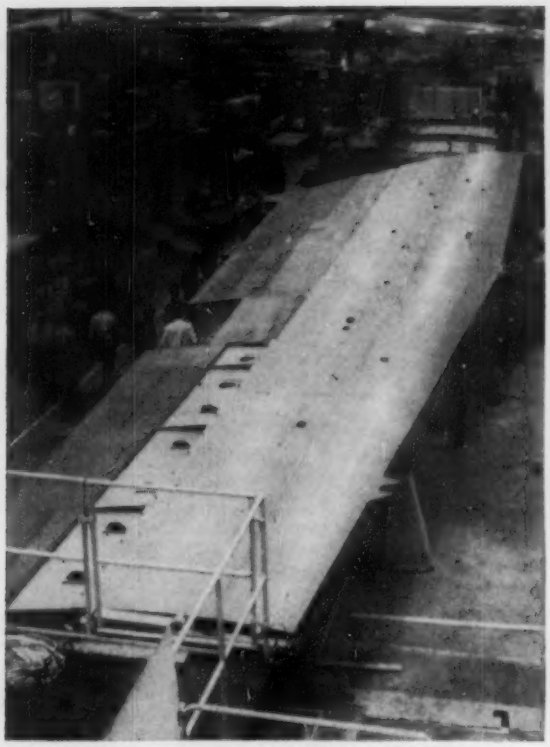
Stratofortress: Kansas Wing, Seattle Body



MASSIVE FUSELAGE SECTION of B-52 Stratofortress being lowered gingerly from crane onto floor jig for installation of parts and other equipment at Boeing-Seattle.



B-52 HORIZONTAL stabilizer gets final touches at Cessna plant in Wichita.



B-52 INBOARD WING section at Boeing-Wichita.

USAF Contracts

Following is a list of recent contracts announced by the United States Air Force.

Bendix Radio Div., Bendix Aviation Corp., Baltimore, AN/ARC-33 UHF radio set, complete, spare parts, test equipment, $720,588.

Hughes Tool Co., Culver City, Calif., acquisition and installation of a noise suppressor for the flight testing of interceptor fire control systems, $97,500.

Bridgeport Brass Co., Bridgeport, Conn., facilities for the production of forgings and extrusions, $75,000.

Motorola, Inc., Chicago, spare parts, maintenance tools and test equipment for radar set, $1,775,725.

North American Aviation, Inc., Los Angeles 45, spare parts, special tools, mobile trng. unit and various related equipment, $251,260.

Radio Corp. of America, Los Angeles, components of AN/APN-70 and spare parts, $1,020,892.

Paramount Products, Inc., Peabody, Kan., trailers, fuel servicing, spares, 15 ea., $29,992.

Kollsman Instrument Corp., Elmhurst, N. Y., indicators, 653 ea., $28,405; indicators, vert., 1,619 ea., $116,907.

Weston Electrical Instrument Corp., Newark 5, N. J., temperature indicators, 2,262 ea., $89,914.

Nasco Inc., Miami, Fla., generators, aircraft engine, 3 ea., 130 ea., 26 ea., $50,429.

Goodyear Tire and Rubber Co., Inc., Akron 16, Ohio, brake assys., 138 ea., wheel assys., 138 ea., wheel assys., 40 ea., $59,275.

Varo Mfg. Co., Garland, Tex., D-4 power supplies, spare parts, data, $587,491.

Stewart-Warner Corp., Electric Div., Chicago, components of radio altimeter spare parts, $39,814.

General Electric Co., Schenectady, N. Y., constant speed drives, 10 ea., $296,700.

Union Electric and Mfg. Co., Jersey City 7, N. J., headset, microphone adapter, $319,780.

Wm. R. Whittaker Co., Ltd., Los Angeles 38, actuators, motors, $55,443.

Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., indicators, spare parts, $281,502.

Houston Fearless, Los Angeles, Calif., developing outfits, 10 ea., $57,644; temp. control units, 176 ea., $164,556.

Jack and Heintz, Inc., Cleveland, generators, tachometer, 1,153 ea., $28,535.

Weston Electrical Instrument Corp., Newark, N. J., indicators, temperature, exhaust, 2,579 ea., $192,515.

Scintilla Div., Bendix Aviation Corp., Sidney, N. Y., filter assays and components, 1,963 ea., $2,535.

Massillon-Cleveland-and-Akron Sign Co., Massillon, Ohio, radar reflective tow targets, 3,550 ea., $434,697.

Sam Orleans and Associates, Inc., Knoxville, Tenn., production of motion picture project, 1 ea., $29,900.

Kearfott Co., Inc., Little Falls, N. J., incorporation of various spare parts for aircraft, $87,848.

Ruthrauff and Ryan, Inc., New York 17, N. Y., purchase of classified ad space, $79,390.

Canadian Commercial Corp., Washington, D. C., L-20 airplanes and data, special tools, and GHE, 28 ea., $1,227,792.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., wheel assys., 168 ea., brake assys., 168 ea., brake assys., 510 ea., $722,956.

General Electric Co., West Lynn, Mass., generators, 28 ea., 25 ea., control panels, 69 ea., $113,481.

American Air Filter Co., Inc., Herman Nelson Div., Moline, Ill., misc. spares for type A2 blower and BT 400 series portable heaters and GI heaters, 193 ea., ducts, complete, 14-in. dia., 41 ea., clip duct, 1,084 ea., duct, 14-in. dia., 793 ea., hose assys., exh., 128 ea., name plates, instruction, 133 ea., name plates, instruction application, Type A2 blower, 133 ea., prime mover assys., electric motor driven, complete, 100 ea., $164,042; heaters, engine and shelter, port., ground, gasoline burning, gasoline engine driven, variable output up to 400,000 Btv. per hr., type H-1, 161 ea., $233,482; spare parts, $35,022.

Stanford Research Institute, Stanford, Calif., research on utilization of a solar furnace, $45,050.

TWELVE STRATOFORTRESSES nearing final stage of assembly at Boeing Field, Seattle, before delivery to USAF Strategic Air Command. The 350,000-pound, eight-jet bombers have a top speed of more than 650 mph. and an unrefueled range of about 6,000 miles.

ALL THE B-52s are equipped with Boeing-developed Flying Booms for air-to-air refueling that provides intercontinental range. Production of B-52s was accelerated after U. S. government learned of startling new technological progress made by the Soviet air force.

Propulsion Research Corp., 1860 Franklin St., Santa Monica, Calif., theoretical and experimental supersonic flow studies related to turbomachine design, $87,833.

Aerojet General Corp., Azusa, Calif., a study of combustion instability in solid propellant rockets, $28,665; research on ultra energy fuels for rocket propulsion, $38,385.

Board of Trustees of the Univ. of Ill., Urbana, Ill., continuation of research, theoretical study of the properties in insulating and conducting solids, $34,250.

Atlantic Research Corp., Alexandria, Va., research on solid propellant combustion, $48,418.

Antioch College, Yellow Springs, Ohio, a study of hydrothermal reactions, $50,020.

Boeing Airplane Co., Wichita, facilities for the production of B-47 and B-52 acft., $2,242,000.

Stewart-Warner Corp., South Wind Div., Indianapolis, facilities for the production of fuel cell purge gas generators, $31,000.

Gilfillan Bros., Inc., Los Angeles, communication kit for trainer, 1 ea., $80,409.

Radioplane Co., Van Nuys, Calif., autopilot control seats, $71,589.

Cessna Aircraft Co., Wichita, procurement of static test airplane and services, $159,782.

Ford Instrument Co., Div. of Sperry Corp., Long Island City, N. Y., components of computer set, latitude and longitude, $35,586.

Johnson Fare Box Co., Chicago 40, spare parts for gun charger, $43,036.

General Motors Corp., Allison Div., Indianapolis, trng. parts, tools and equipment to be procured to support J35-A-35 trng. command engines, $100,000.

Kelsh Instrument Co., Inc., Baltimore, stereoplotter, projection, 6 ea., $44,097.

Bendix Aviation Corp., Utica Div., Utica, N. Y., spare parts, $42,193.

Curtiss-Wright Corp., Propeller Div., Caldwell, N. J., retrofit kits, tools and revisions to manuals, $175,600.

Royal Jet, Inc., Alhambra, Calif., tank assy., left hand, tank assy., right hand, 472 ea., $520,795.

Lear, Inc., Grand Rapids, Mich., indicators, 534 ea., control, roll and pitch, 600 ea., 384 ea., $2,243,215.

Mast Development Co., Davenport, Iowa, image adapter, test set LM-30, 56 ea., $60,232.

Seymour Wallas and Co., St. Louis 4, tow target, aerial banner, radar reflecting, 1,000 ea., $35,840.

Warner News, Inc., N. Y. 22, N. Y., write script for motion picture project and compile storyboard, 20 ea., produce motion picture, 1 ea., $25,181.

Lear, Inc., Grand Rapids, Mich., indicators, vertical gyro, remote, 650 ea., controls, vertical gyro, type K-4B, 224 ea., $2,332,246.

R. C. Allen Business Machines, Inc., Grand Rapids, Mich., indicators, turn and slip, type MD-1A, 240 ea., indicators, turn and slip, 100 ea., indicators, turn and slip, 97 ea., $71,071.

General Electric Co., Waynesboro, Va., regulator, generator, 227 ea., 130 ea., 26 ea., $173,431.

Colonial Broach Co., Detroit, broaching machines, 3 ea., $193,350.

Munston Mfg. and Service, Inc., Islip, N. Y., control panel, C-411A, $48,091.

MPO Productions, New York 22, N. Y., write script for motion picture and production of motion picture, $49,061.

Oregon Industries, Inc., Oregon, Wis., mountings for radio set AN/ARC-3, $41,097.

Craven Film Corp., New York 19, N. Y., write script for project 191996, furnish storyboard, produce motion picture, $44,634.

Sperry Gyroscope Co., division of Sperry Corp., Great Neck, N. Y., stabilizer assembly, A-1A bombing navigational computer, 259 ea., transmitter, true heading, A-1A bombing navigational computer, 396 ea., $2,258,904; control, roll and pitch, 87 ea., spare parts, special tools and engineering and handbook data, $108,023; electronic control, 107 ea., spare parts, data, $546,105; flight computer indicator component, 29 ea., control assy., component of flight computer, 50 ea., amplifier, 72 ea., control quick erector, 142 ea., $261,550; control, roll and pitch, 13 ea., control servo single motor, 15 ea., motor and drive assy., servo, 349 ea., handbook and engineering data, $568,307; amplifier, 94 ea., installations, spare parts and data, $388,677.

A. C. Spark Plug Division, General Motors Corp., Flint, Mich., amplifier, stabilization, 351 ea., control navigational, 140 ea., synchronizer, radar, 363 ea., $3,261,669; bombing system, 35 ea., spare components,

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In one of the country's largest and best equipped rocket engine facilities, Bell has developed and is producing engines for the Rascal and Nike missiles as well as for other projects. The famous Bell series of high performance research aircraft — X-1, X-1A, X-2 and X-5 — is supplying today's information for tomorrow's tactical planes.

Improved Bell helicopters are serving every branch of the military services. The revolutionary XV-3 convertiplane will provide a link between fixed-wing and rotary-wing aircraft and the Bell jet VTOL (vertical takeoff and landing) promises to change the entire concept of military and commercial aviation, launching a new era of flight.

These and many other projects are being pushed forward to gratifying conclusions by a company founded on the premise of helping to make America strong. In hot war, cold war, or peace, Bell Aircraft's engineers, skilled factory workers and modern facilities work progressively toward protecting our American way of life. National Defense has always been, is now, and will continue to be *our business.*

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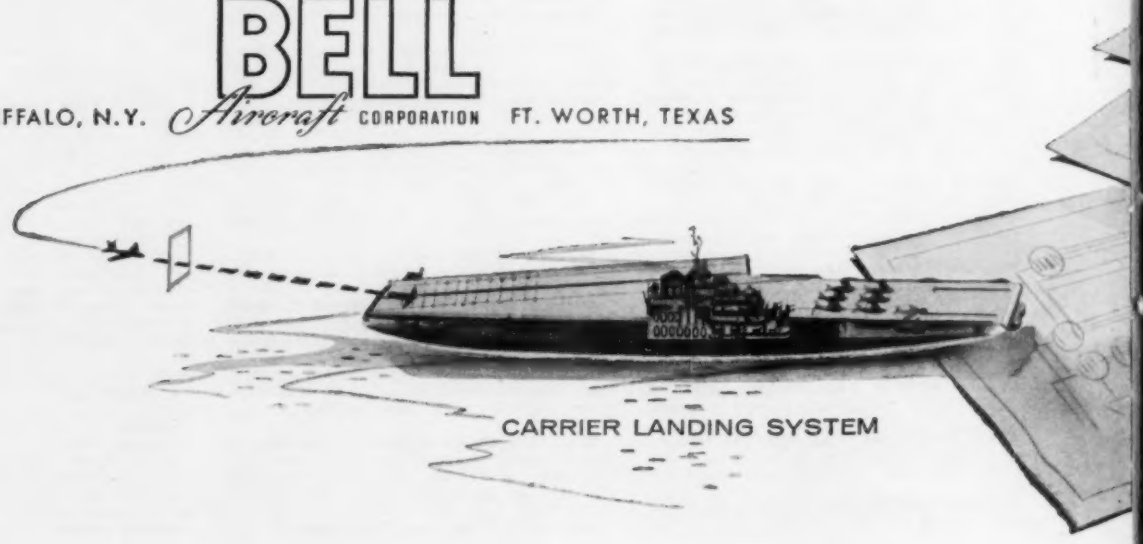
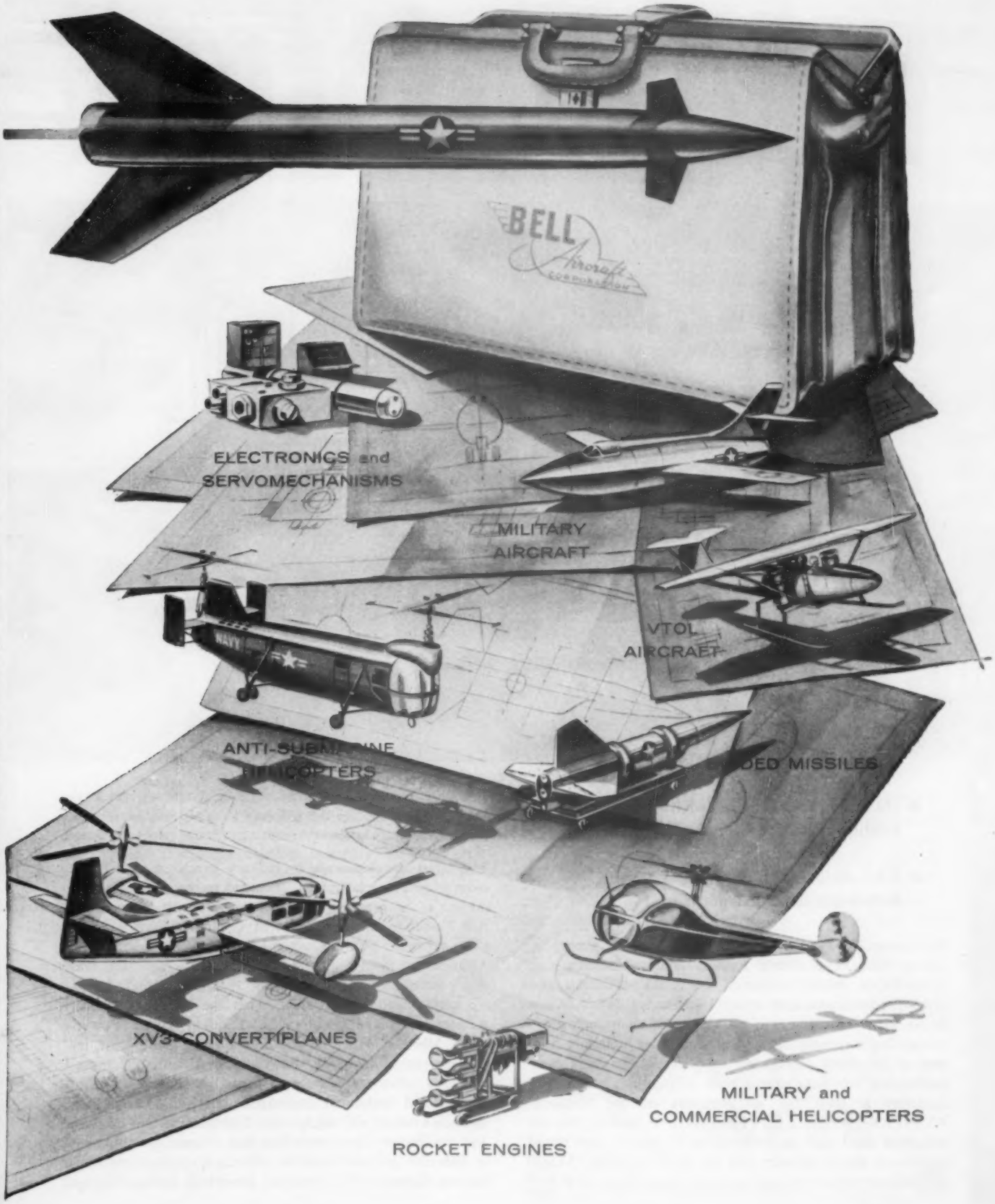


CARRIER LANDING SYSTEM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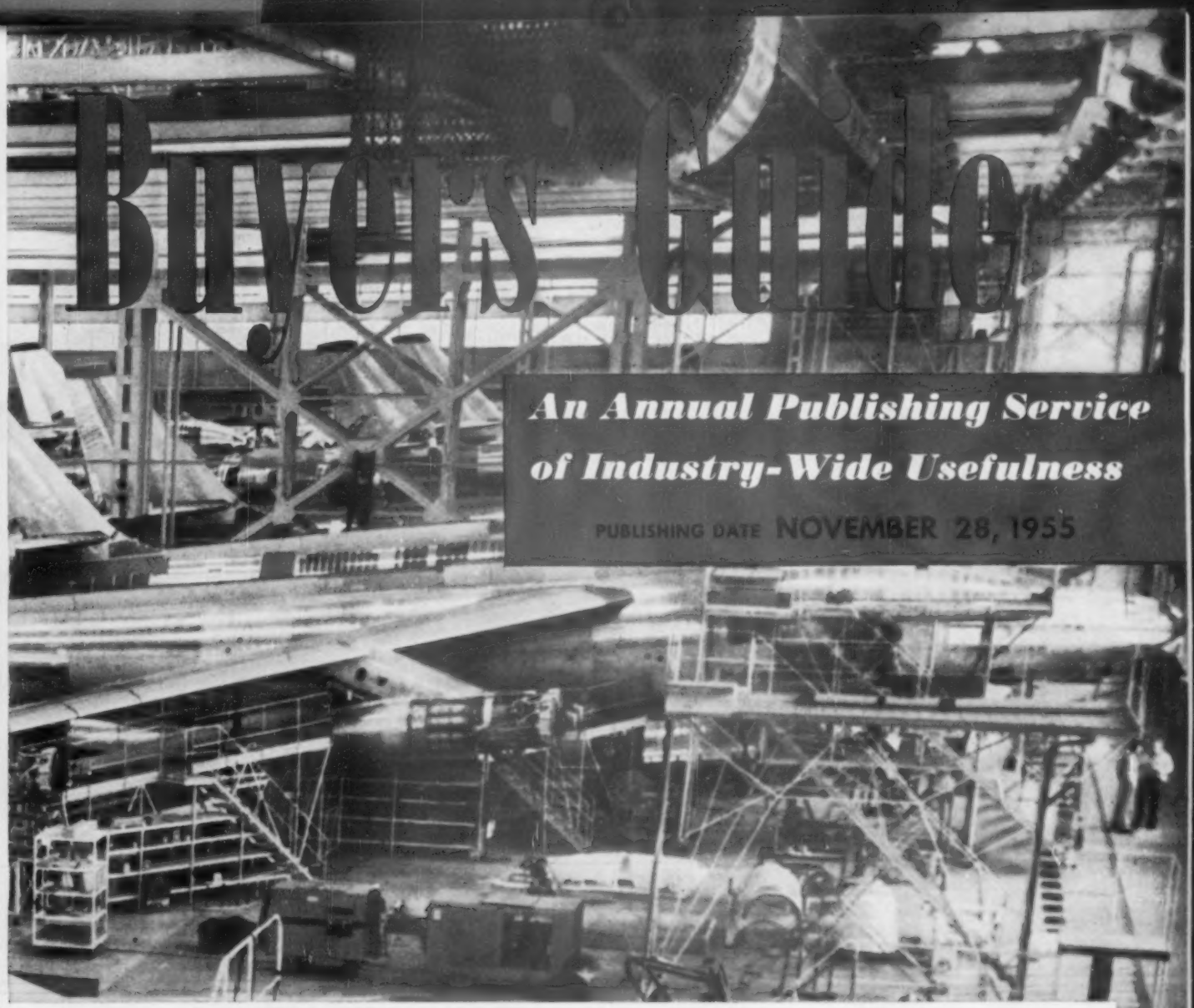

ment, Hardware, Hydraulics, Instrumentation, Materials—including fuels, plastics, and chemicals, Tooling. **Nuclear Power Systems;** Accessories and components, Design services, Reactor fabrication. **Airlines and Airports;** Scheduled carriers, Non-scheduled carriers, Cargo carriers, Ground equipment, Lighting.

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spare parts, maintenance tools and test equipment, $3,984,787.

General Electric Co., Johnson City, N. Y., fire control system, spare components and spare parts for B-47 aircraft, $314,672; facilities for radar maintenance and repair, $129,978.

Weston Electrical Instrument Corp., Newark, N. J., indicator, $881,403.

Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., control, roll and pitch, 134 ea., $130,708.

Minneapolis-Honeywell Regulator Co., Minneapolis, components of autopilot, $1,387,520; fire control couplers, spare parts, special tools and test equipment and data, $2,647,981.

General Mills, Inc., Mechanical Division, Minneapolis, spare parts for Y-4 bombsight, $100,000.

Eastman Kodak Co., Rochester, N. Y., spare parts used on Y-3 bombsight, $106,000.

Piasecki Helicopter Corp., Morton, Pa., spare parts for 90 H-21C helicopters, $8 million.

Bell Aircraft Corp., Helicopter Division, Fort Worth, Tex., helicopters, H-13H, 21 ea., spares, special tools, ground handling equipment and data, $443,000.

Convair Division, General Dynamics Corp., San Diego, pre-production expenditures for F-102B airplane program, $5 million.

Raytheon Mfg. Co., Waltham, Mass., transmitting set, 400 ea.; transmitter group, 800 ea.; transmitter group, 134 ea.; $4,752,180.

Canadian Commercial Corp., Washington, D. C., aircraft, L-20A, 31, ea., spare parts, special tools, $711,534.

Crosley Division, Avco Mfg. Corp., Cincinnati, radio receivers, mountings, spare parts, special tools and data, $1,303,037.

Hallicrafters Co., Chicago, transmitter, radio, 1192 ea., transmitter, radio, 108 ea., power supply, 782 ea., $2,903,204.

Cessna Aircraft Co., Wichita, Kan., aircraft, L-19A, 100 ea., spare parts, special tools, ground handling equipment, $438,992.

Trad Television Corp., Asbury Park, N. J., adapters, spare parts and data, $427,714.

Collins Radio Co., Cedar Rapids, Iowa, radio set, $3,384,604.

Polytechnic Institute of Brooklyn, 99 Livingston St., Brooklyn 1, N. Y., investigation of favorable 3-dimensional interference effects in supersonic flow (AF 18(600)-694), $139,000.

Regents of the University of Wisconsin, Madison 6, Wis., research, lattice imperfections in crystals (AF 18(600)-698), $25,230.

Trustees of Princeton University, Princeton, N. J., research, oxidation of metals and alloys, (AF 18(600)-967), $63,550.

Carnegie Institute of Technology, Pittsburgh 13, continuation of research on conformal and variation methods (AF 18(600)-1138), $36,998.

University of Utah, Salt Lake City 1, continuation and extension of high velocity impact studies (AF 18(600)-1217), $75,000.

Northwestern University, 619 Clark Street, Evanston, Ill., investigation of phase transformations and other structural changes by measurement of elasticity and internal friction (AF 18(600)-1468, $35,112.

Polytechnic Institute of Brooklyn, 99 Livingston St., Brooklyn 1, N. Y., research, electomagnetic theory and information processes (AF 18(600)-1505), $60,000.

Trustees of Princeton University, Princeton, N. J., research on combustion processes in rocket motors (AF 18(600)-1527), $36,163.

University of Rochester, Rochester, N. Y., photochemical studies (AF 18(600)-1528), $31,515.

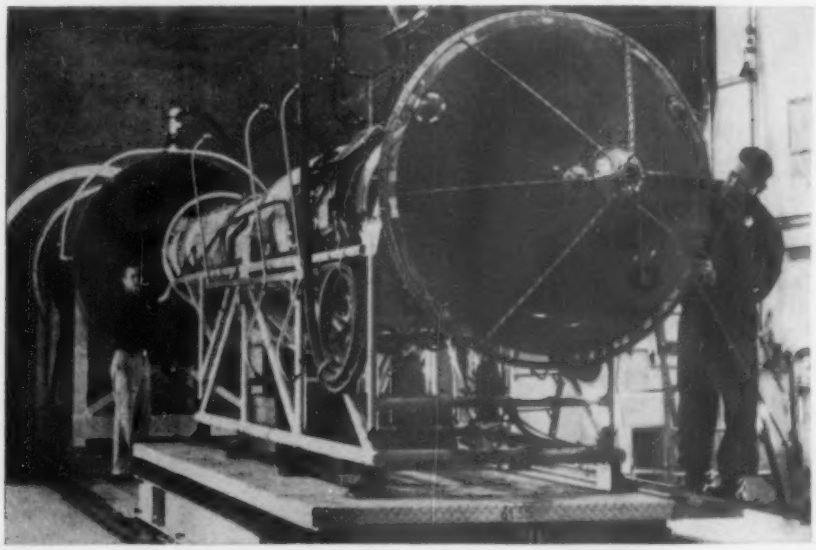
Rand Corp., Santa Monica, Calif., study of intercontinental warfare, other than surface (AF 33(038)-6413), $1,000,000.

North American Aviation, Inc., International Airport, Los Angeles, utility-command aircraft study, (IFB AF 18(600)-1520), $64,996.

Beech Aircraft Corp., Wichita 1, utility-command aircraft study, (IFB AF 18(600)-1519), $47,910.52.

University of Maryland, College Park, Md., study of "phenomena surrounding highspeed flight," (IFB AF 18(600)-993), $72,000.

Fairchild Aircraft Div., Fairchild Engine & Airplane Corp., Hagerstown, Md., utility-command aircraft study, (IFB AF 18(600)-1515), $58,469.65.



Ryan Tests Avon for XF-109

Rolls-Royce Avon jet engine in new $175,000 Ryan Aeronautical test cell shows powerplant which will be used in Ryan's XF-109, new USAF vertical jet takeoff plane. Although company officials will make no comment, Aviation Week has learned that the Rolls-Royce engine fitted with afterburner will power the XF-109, which is now at Edwards AFB for flight tests (AW Aug. 22, p. 7). The cell is the nation's first facility for testing tourbojets in both horizontal and vertical attitudes. It also has been used in metallurgical research for high-temperature components of all kinds of powerplants for aircraft and missiles.

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Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, are:

U. S. Gauge Div., American Machine and Metals Inc., Clymer Ave., Sellersville, Pa., transmitters, 1,487 ea., $94,488.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., assys., $39,728; carburetors, $264,598.

Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland, strut assys., 13 ea., $42,423; nose struts and parts, $12,763.

Holley Carburetor Co., 11955 E. Nine Mile Rd., Van Dyke, Mich., maintenance parts, $62,205; maintenance parts for J48 engines, $199,792.

Red Bank Div., Bendix Aviation Corp., Eatontown, N. J., generators, $420,411.

Atlas Paint and Varnish Co., Inc., 50 Buffington Ave., Irvington, N. J., enamel, $298,284.

Hub Paint and Varnish Co., Inc. 47-38 Fifth St., Long Island City, N. Y. enamel, $274,087.

Fairchild Engine & Airplane Corp., Farmingdale, Long Island, N. Y., tools, 8 ea., $29,722.

General Electric Co., 1405 Locust St., Philadelphia 2, Pa., brush, rotor and shunt used on various generators, $33,638.

Davis Aircraft Products, Inc., 1191-5 Spofford Ave., New York 59, N. Y., belt assys, 5,062 ea., $37,650.

Jackson and Moreland, 600 Park Sq. Bldg., Boston 16, Mass., handbooks, $41,100.

Pervo Paint Co., 6624 Stanford Ave., Los Angeles, Calif., enamel, 21,500 gal., $40,870.

Columbian Rope Co., 309 Genesee St., Auburn, N. Y., wadding, bound hair, $25,590.

Westinghouse Electric Corp., 3001 Walnut St., Philadelphia, Pa., services, 25 ea., $298,250.

General Laboratory Associates, Inc., 17 E. Railroad St., Norwich, N. Y., ignition units and compositor assys., $88,228.

Breeze Corps., Inc., 700 Liberty Ave., Union, N. J., ignition harnesses, $40,292.

Goodyear Tire and Rubber Co., 1144 E. Market St., Akron 16, Ohio, wheel assys., 122 ea., $37,016.

Purolator Products, Inc., 970 New Brunswick Ave., Rahway, N. J., element and filter assys., $34,498.

Scintilla Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., coils, 350 ea., $28,200.

Benjamin Franklin Paint and Varnish Co., 4820 Lagdon St., Philadelphia, Pa., enamel, 18,000 gal., $42,090.

AiResearch Mfg. Co., 9851-9951 Sepulveda Blvd., Los Angeles, maintenance parts used on gas turbine compressors and power units, $26,577.

Glenn L. Martin Co., Baltimore 3, maintenance parts used for PBM spares, $36,925.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., testers, 94 ea., $94,690.

Airheart Products, Inc., 2502 Cherry St., Long Beach, Calif., cable brake releases, 13,000 ea., $157,950.

Ace Engineering and Machine Co., Inc., 3644 North Lawrence St., Philadelphia, Pa., electromagnetic shielded enclosures, 125 ea., $199,465.

General Electric Co., West Lynn, Mass., generators, 28 ea., 25 ea., control panels, 69 ea., $113,481.

BuAer Contracts

The following contract awards of $25,000 and more have been announced recently by the Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.

Kollsman Instrument Corp., 80-08 45th Ave., Elmhurst 73, N. Y., tachometer indicators and spare parts, NOAs 55-652-f (PD-42-3011-55), 610 ea., $48,982.

Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., signal generators, NOAs 55-940-f (EL-41-1218-55), 10 ea., $39,807.

AiResearch Mfg. Co., 9851-9951 Sepulveda Blvd., Los Angeles, auxiliary power units and spare parts, NOAs 55-642-r (PD-43-3087-55), 123 ea., $3,258,443.

Hazeltine Electronics, Corp., 58-25 Little Neck Parkway, Little Neck 62, L. I., N. Y., listening sonobuoys, NOAs 55-734-f (EL-46-1336-55), 7,300 ea., $1,065,800.

Magnavox Co., 2131 Bueter Rd., Fort Wayne, Ind., listening sonobuoys, NOAs 55-735-f (EL-46-1338-55), 11,300 ea., $1,471,826.

Sparks Withington Co., Spartan Radio-Television Div., Jackson, Mich., listening sonobuoys, NOAs 55-736-f (EL-46-1337-55), 8,500 ea., $1,177,930.

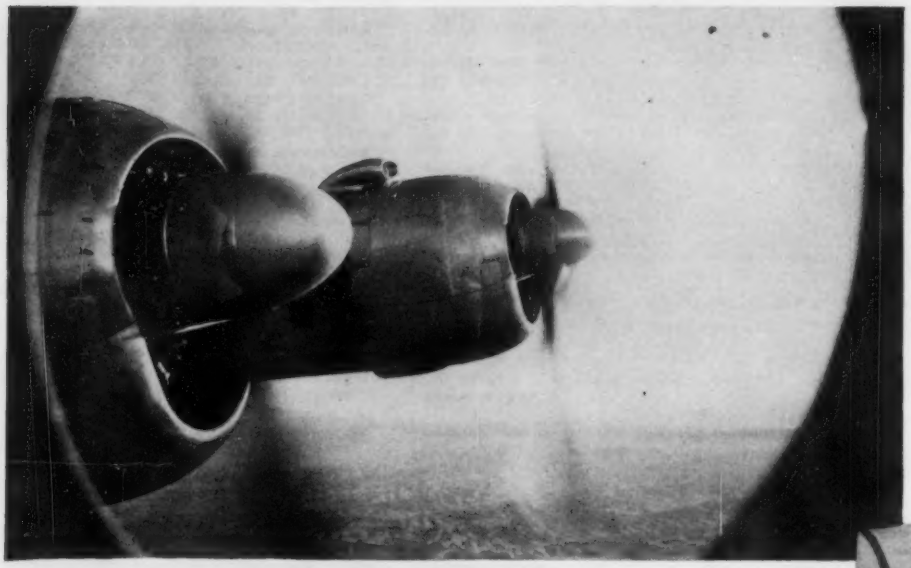
Sanders Associates, Inc., 137 Canal St., Nashua, N. H., listening sonobuoys, NOAs 55-737-f (EL-46-1262-55), 7,430 ea., $1,162,333.

General Electric Co., Schenectady, N. Y., remote compass transmitters, NOAs 55-707-f (PD-42-3014-55), 654 ea., $121,479.

Viking Camera and the Far West

Camera in Viking 12 (at right) snapped picture (above) from 143.4 miles up, catching part of northern Mexico, the Gulf of California and Lower California (shown jutting out of the picture in upper left). Moving to the right in the picture from the Gulf of Mexico are the Laguna Salada and the Salton Sea. The lower right hand corner shows the Phoenix, Arizona, area and Lake Roosevelt. The shutter of the K-25 camera was snapped just as the Navy rocket began its descent from its peak altitude of 143.5 miles during a test run for the Naval Research Laboratory's upper atmosphere research program. The picture, recorded on infrared film, was taken on Feb. 4, but was released for publication only this month by the Department of Defense in Washington. The Naval Research Laboratory, with headquarters in Washington, has been conducting its upper atmosphere research program with rockets for the government since 1946. The Viking is the largest single-stage American rocket designed and built specifically as an upper-atmosphere research vehicle.

FLY WEATHER-WISE



These weather items prepared in consultation with the United States Weather Bureau

Rain drops from heavy cumulus clouds which fall from colder altitudes may cool cylinder heads enough to cause engine to misfire. Avoid heavier showers wherever possible.

Unlike showers, rain falling from stratified cloud layers may be warmer than the air through which it falls. Be prepared for poor visibilities in the cold air near the ground, as fog is likely.

To avoid turbulence along squall lines, plan your trip through the northern quarter of an active low. Although instrument conditions and ice in the winter may be encountered, the severest weather will be avoided.

Even though stations report good weather—conditions in between are occasionally poorer. You may be unable to maintain visual contact. Check all available information on en route weather as well as your terminal weather.

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STEERING CLEAR of stormy weather can add miles to your flight. Weather-wise pilots safeguard themselves with an extra margin of safety... keep tanks filled with Mobilgas Aircraft... protect engine performance with Mobiloil Aero. These famous products are the result of 89 years of research and experience—favorite with aviators since the Wright Brother's first flight. Why accept less for your plane?

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New Stock Changes Reported by SEC

The following recent exchanges of aviation stock were reported by the Securities and Exchange Commission in a summary of security transactions.

• **Seaboard & Western Airlines Inc.** Disposal of 600 common shares by Carl D. Brell, officer, leaving a holding of 26,525; acquisition of 300 common shares by Harold Montee, officer, making a holding of 10,976; disposal of 1,000 common shares by Arthur V. Norden, officer and director, leaving a holding of 24,871; disposal of 2,000 common shares by Raymond A. Norden, officer and director, leaving a holding of 25,337; disposal of 500 common shares by Charles B. Ripley, director, leaving a holding of 23,000.

• **Solar Aircraft Co.** Disposal of 200 common shares by Herbert F. Sturdy, officer and director, his total holding.

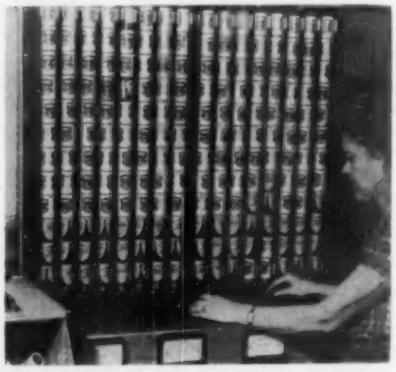
• **Sperry Corp.** Disposal of 700 common shares by Thomas B. Doe, director, leaving a holding of 1,055; disposal of 2,000 common shares by Charles M. Green, officer, leaving a holding of 400; disposal through exchange or conversion of 2,100 common shares by I. J. Harvey, Jr., director, his total holding; disposal of 1,575 common shares by K. R. Herman, officer, his total holding; disposal of 1,820 common shares by Bert T. Oakley, officer, his total holding; disposal of 900 common shares by Charles Ondrick, officer, leaving a holding of 500; disposal of 10,182 common shares by John Sanderson, officer and director, his total holding; disposal of 32,340 common shares through exchange or conversion by Harry F. Vickers, officer and director, his total holding.

• **Trans World Airlines Inc.** Disposal of 500 common shares by John A. Collings, officer and director, leaving a holding of 1,769.

• **United Air Lines Inc.** Disposal of 100 shares of 4¼ pc cumulative preferred by Eric A. Johnston, director, leaving no holding; acquisition of 1,200 shares by class A common by Eric A. Johnston, director, making a holding of 2,000.

• **United Aircraft Products.** Acquisition of 500 common shares by Harry Harris, director, making a holding of 1,581; acquisition of 500 common shares by Lester Saphier, director, making a holding of 1,040.

• **Westinghouse Electric Corp.** Acquisition of 500 common shares by John M. McKibbin, officer, making a holding of 3,536.



Cell Mates Rejuvenated

Compact bench-size battery rejuvenator used at Northrop Aircraft, Inc.'s Hawthorne plant, extends life of flashlight batteries by 400%. Unit holds 184 batteries, charges them in two hours. The salvage operation paid for the cost of the charger in 45 days, says Northrop, which uses about 13,000 batteries a month at Hawthorne. Majors Aircraft Engineering Co., Hawthorne, Calif., manufacturers the equipment.

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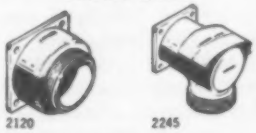

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AN3111

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Protect contacts and insulators from moisture, foreign matter. Protect "live" circuits. With or without chains.

AN3058 with AN3066 locknut. The Cannon line includes AN3054, AN3055, AN3056, AN3058, AN3064, AN3066, AN3068.

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Please refer to Dept. 140

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Electronic Aids Speed Quality Control

By J. M. Thompson and S. Maszy*

The quality requirements for materials that will be used in high-performance aircraft of the future make non-destructive testing imperative. But test techniques must be accurate, efficient and easy to use.

For these reasons, electronic instruments are playing an increasingly important part in quality control. At Convair-Ft. Worth their use has not only reduced the man-hours required but has also improved the quality of work produced.

The processes and materials used in the fabrication of aircraft are costly because of the precise workmanship, close tolerances and high-grade materials required.

Verifying the quality of parts is expensive, if representative parts must be destroyed to determine the quality of a number of identical items, or if an entire assembly must be disassembled and reassembled to check components.

Prior to World War II, material and labor were cheaper; therefore, extensive mechanical testing was not objectionable. Today, materials and labor are at a premium, and costs must be reduced by eliminating expensive methods of inspection and quality control by substituting improved methods.

Properties and Defects

Electronic instruments have been perfected to such a degree that the internal structures and composition of parts and material can be easily determined.

There are electronic instruments that can check material as to heat treatment, hardness, type of metal and alloy, as well as presence and size of internal defects (such as cracks and holes).

Other types of electronic instruments give fast and accurate determinations of various elements contained in solids and liquids.

Still other electrical equipment, using the color spectrum, can be employed to determine various components of different materials.

Electronic instruments also reduce human error to a minimum. The accuracy of such instruments is generally higher than that of most mechanical types of testing equipment.

The types of electronic instruments being used at Convair-Fort Worth are divided into two classes:

• **Inspection department tools** to verify the quality of the product and the conformance of a particular part to a specific drawing.

• **Laboratory instruments** used by trained personnel to evaluate material requirements with respect to government and other specifications not directly related to dimensional properties.

Many inspection functions may be accomplished by visual examination where the quality of the product depends upon its appearance or other visible characteristics. Some surfaces must be checked by an instrument to assure the correct finish. This is a "physical" type of inspection and is done by the inspection department at Convair-Fort Worth.

The "physical" inspection of aircraft parts has been improved by electronic instruments such as the Reflectoscope, Sonizon, Audigauge, Fluoroscope, and Magnaflux.

The chemical characteristics or composition of the parts are determined by the process control laboratory using the Spectograph, Quantometer, Spectrophotometer, and X-ray.

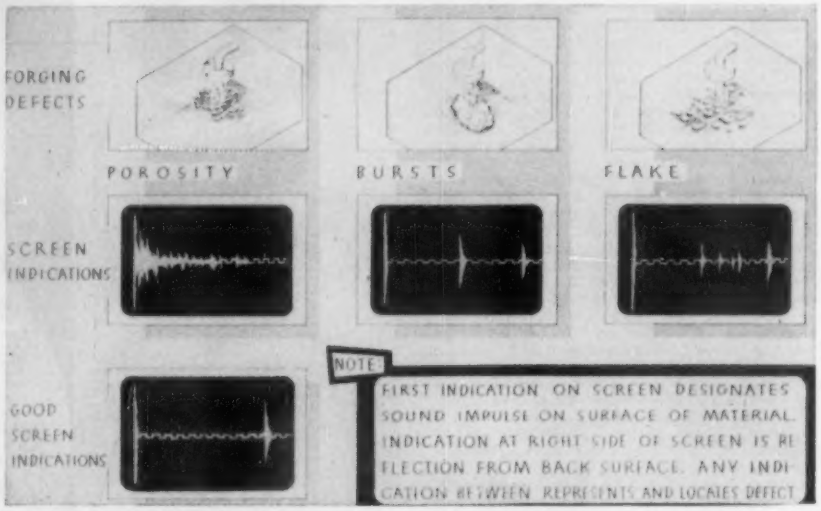
FORGING DEFECTS
POROSITY
BURSTS
FLAKE
SCREEN INDICATIONS
GOOD SCREEN INDICATIONS
NOTE
FIRST INDICATION ON SCREEN DESIGNATES SOUND IMPULSE ON SURFACE OF MATERIAL. INDICATION AT RIGHT SIDE OF SCREEN IS RE FLECTION FROM BACK SURFACE. ANY INDI CATION BETWEEN REPRESENTS AND LOCATES DEFECT

CHART above is used by Reflectoscope operator at Convair-Fort Worth. On the Reflectoscope, porosity appears as "hash," bursts as single pips and flakes as multiple pips.

Reflectoscope

The Reflectoscope is a non-destructive instrument for locating internal defects in metals and other materials. It employs ultrasonic vibrations which are transmitted and received through a thin quartz crystal. The Reflectoscope produces a visual indication which enables the operator to instantly and accurately locate large and small defects in the part (see sketch above).

Standard test blocks having defects of known size and location are used to regulate and adjust the Reflectoscope. It is portable but requires a source of 110-v. a.c. power.

Parts which have irregular shapes and rough surfaces can be scanned ultrasonically for internal defects by submerging them in water. The scope is mounted on a traveling platform (see photo, p. 59) which can be moved in any direction in order to inspect all areas of the part. A hood attachment cuts glare caused by outside light.

Sonizon

Another instrument, the Sonizon, is essentially an electronic micrometer which can be used to measure the thickness of material or the depth of an internal flaw. The device employs a hand probe containing a quartz crystal, which is placed on the material to be inspected. The crystal is fed a constantly changing high-frequency impulse which is converted to ultrasonic waves that travel to the opposite face of the material and are reflected back to the crystal.

When the "echo" sound waves arrive as the next waves are leaving the crystal, an energy change occurs in the electronic circuits. The energy is amplified, causing a peak to occur on the cathode ray tube. The location of the peak on

* The authors are employed at Convair-Ft. Worth, where Mr. Thompson is a research metallurgist and Mr. Maszy is a senior metallurgist.

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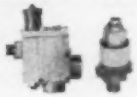

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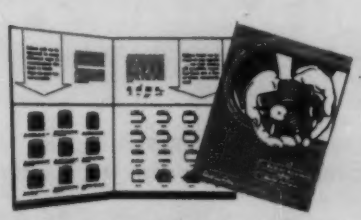

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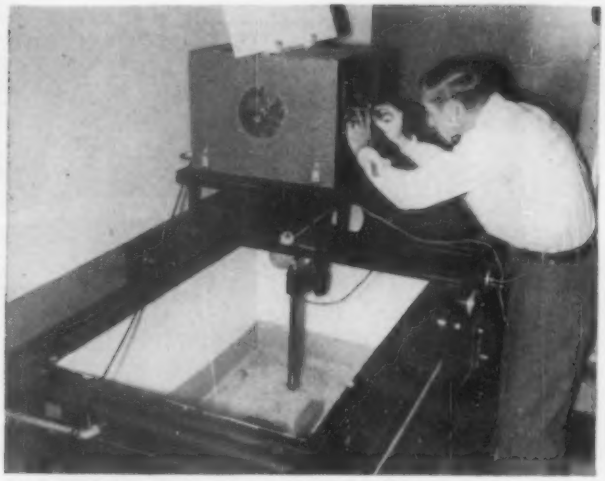
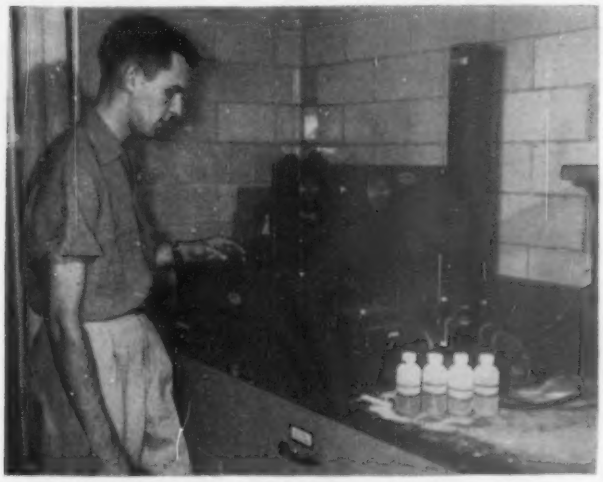
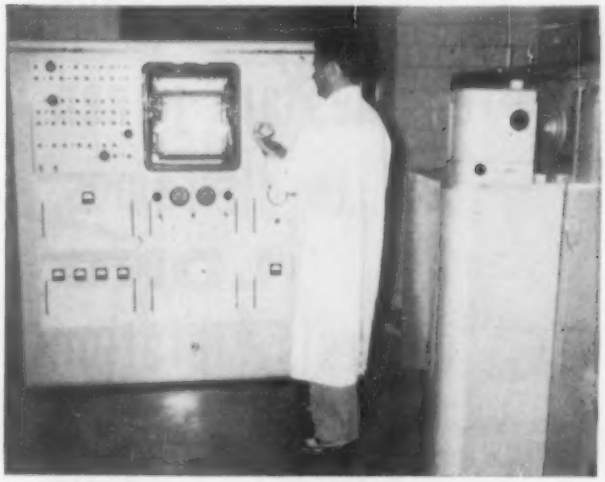
SONIZON, shown above with scale calibrated in inches, measures the thickness of a part.



ONE METHOD of ultrasonic inspection is by under-water scanning. Scope can be moved in any direction.



BECKMAN MODEL DU Quartz Photoelectric Spectrophotometer used to identify types of chemical solutions.



QUANTOMETER can check materials for chemical composition at a rate of one every 10 seconds or less.

a calibrated scale gives a direct reading of the thickness of the material or, in the case of a defect, the depth of the defect. The instrument is accurate to within 2% for either thickness or depth measurements.

The Sonizon has been used for many types of inspection that formerly required the destruction of parts such as engine cylinder walls, fuel tanks, and propeller blades.

Audigauge

The Audigauge provides a non-destructive, rapid and accurate means of inspecting "blind wall" thickness of aircraft skins, tanks and pipe when only one side is accessible. This inspection method eliminates special tools, costly shut-downs and destructive drilling and plugging inspection methods.

It can be used on such different materials as copper, aluminum, nickel, steel, glass and plastics. However, wood, concrete or any porous material cannot be tested. Cast materials may be measured with the Audigauge but with more difficulty because of the internal damping effect. Convair-Fort Worth has used the Audigauge to locate laminar flaws and to determine the effectiveness of the bond between materials.

Measurement is made by placing a vibrating quartz crystal in contact with one side of the material under test so that an ultrasonic wave is transmitted into the material. This wave travels in a narrow beam through the material and is reflected by the opposite surface.

These harmonic signals are located by moving a calibrated dial. The signals are indicated automatically through earphones to the operator and also on a calibrated dial.

At certain frequencies, when the transmitted and reflected waves are in phase, there will be a relatively large increase in the amplitude of the wave in the material. This is a resonance condition occurring at a fundamental frequency which is inversely proportional to the velocity of the sound in the material. Since the velocity of sound is a known constant, the determination of the fundamental frequency required to produce resonance is an accurate and reliable measure of an unknown thickness.

For the Audigauge to be effective, all surfaces of the parts to be inspected must be smooth enough so that a thin film of oil, grease or glycerine may be used as a coupling between the crystal and the part. Thin layers of mill scale, plating, enamel or hard paint have little or no effect on the accuracy of the Audigauge. Curved surfaces must have suitable crystals to compensate for the curvature. The Audigauge is a portable, self-contained instrument.

Magnetic Inspection

Magnetic particle inspection, in which a magnetic field is set up in the proper direction within the part, is one of the most widely-used electronic inspection techniques, although only ferromagnetic materials can be checked by such Magnaflux equipment.

Interruptions in the magnetic field, such as cracks, discontinuities and in-

wherever engines are joined to airframes, LORD controls vibration

Effective noise and vibration isolation at the vital link where engine meets airframe is a key to smooth, quiet flight. LORD bonded-rubber engine mountings have consistently proven their ability to control the engine vibration level effectively in all types of power plants—turboprop, jet and reciprocating. On small planes or heavy bombers, military or commercial, under extremes of operating temperatures and environmental conditions, LORD mountings have an impressive record of performance, economy and safety. LORD aircraft engine mountings are lightweight, easy to install, longer-lasting and require fewer replacement parts. They are designed for maximum safety at all times. LORD has a 25-year record of supplying the aircraft industry with the best in engine vibration control. For further information on LORD bonded-rubber products, contact the nearest LORD Field Engineer or write the home office, Erie, Pa.

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clusions, tend to crowd some of the magnetic flux (line of face) outside the surface of the part. These types of leakage fields act as local magnets and attract and hold the finely divided ferromagnetic particles as they are applied. A definite indication is built up in this area showing the extent and shape of the discontinuity.

The magnetic particles may be applied manually or automatically, either as a dry powder or by suspension in a thin oil carrier. Various colors of powder may be used to make the indications stand out clearly on colored surfaces.

The majority of ferromagnetic aircraft parts are 100% inspected by the magnetic particle method for defects, flaws or cracks. This method of inspection, especially for cracks and inclusions, is almost foolproof and is the most accepted method of inspection in the aircraft industry.

The Magnaglo process of magnetic particle inspection is identical to the Magnaflux wet process except that the magnetic particles glow under ultraviolet light. The examination, therefore, must take place in a dark room and under black-light conditions. In this manner, indications that normally would not be seen by the naked eye become more pronounced.

X-Ray

The X-ray machine is a non-destructive testing instrument which uses the penetrating power of X-rays to determine internal defects in raw or finished products.

The X-rays are projected through an object onto a photographic film. The internal construction and the variation in thickness are shown in the exposed film, thus analyzing the entire composition on plane surface. Any variations in a section, such as inclusions, porosity or voids, will show up as a contrast in the film either as light or dark areas or as spots which can be spotted by an experienced operator.

This method is used extensively in foundry control of castings. Defective techniques in pouring castings can be eliminated before production castings are made. The incorrect placing of risers can be spotted and other faulty procedures can be found on test castings. This approach is economical because it prevents foundries from producing defective castings.

X-ray also is used to show whether the internal mechanisms of certain assemblies were properly put together.

Fluoroscope

Fluoroscopic inspection is identical in principle to X-ray examination except the "shadow picture" is reproduced on a fluorescent screen instead of on a photographic plate.

This method of parts examination is instantaneous but limited to thin sections of steel and progressively heavier sections of nonferrous alloys, depending on the degree of X-ray penetration through any particular alloy.

Chemical Analysis

Spectrochemical analysis is a fast, accurate and convenient method of chemically analyzing metallic alloys. It identifies the detectable chemical elements of inorganic compounds by their wave-length characteristics. (The light given off by an element identifies it in the same manner as finger prints identify a human being.)

An unknown material may be identified by a particular element or elements. However, to test a known material to a particular composition specification requires the determination of all elements and the intensities of their respective spectrum in the sample.

The sample to be analyzed is prepared and mounted in the excitation stand. The specimen then is excited (made to emit light) by an electric spark. The wave lengths of the light emitted are sorted out by gratings and recorded on a photographic plate as spectrum lines. The lines are arranged according to their wave-length value on the film and are identified with the aid of charts and tables.

No two elements have the same spectrum; therefore the presence of a particular element is readily detactable. The intensity of the wave length emitted by the element under controlled excitation conditions is a function of the concentration of that element.

Densitometer

By means of the Densitometer, the intensity of the particular spectral line can be calculated into percentage of element present. The results of spectrographic analysis may be obtained in a few minutes as compared to wet chemical analysis which usually takes several hours. Another advantage is that a tiny sample, only a milligram or less in size, obtained from the products of corrosion can be used. The same size sample would be too small for wet analysis.

Many elements are present in materials in such small quantities that without spectroscopic methods of analysis their presence or amounts could not be determined.

Quantometer

The Quantometer (see photo, p. 59) is a highly refined and improved Spectrograph which eliminates the necessity of developing a negative and interpreting results on a Densitometer by accomplishing these functions electronically.

Parts that must be tested for chemical composition can be checked by this means at a rate of one every 10 seconds

D & B RESEARCH

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BLOWERS

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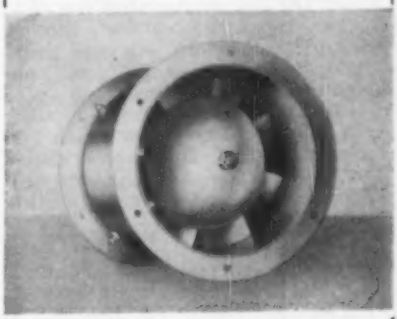

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SPECIFICATIONS

Material—Aluminum, Magnesium, Stainless Steel, Castings, Forgings, Sheet Metal.

Speed—Dependent upon drive unit and performance requirements.

Performance—Total pressure up to 20 inches of water. Flow — 100 c.f.m. to 5000 c.f.m.

Drive Units—Electric Motors — A.C. or D.C. Hydraulic Motors. Air Motors.

Testing—All blowers tested to meet applicable N.A.F.M. and MIL Specifications.
Structural test to 50 per cent overspeed (or as required). All structural and aerodynamic tests conducted in **Dean & Benson Research, Inc.** overspeed spin pit and wind tunnel.

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OVERHAUL COSTS....

There is always a certain attraction about a "bargain" engine overhaul.

But what is most important . . . first cost? . . . or final *cost-per-operating-hour?* Do you realize that the 10% to 15% more you pay for a factory authorized Airwork overhaul eventually saves up to 85% of your engine maintenance costs . . . up to 54% of your total engine operating cost? Do you know how much you save by keeping your plane available for service? Here are some typical cost figures compiled by pilots flying Airwork engines:

Engine Type	Total Hrs. Approved	Average Cost Per Flying Hour
R-985	800	3.25
R-1830	1200	3.00
R-2000	1600	2.69
E-185	800	2.22

Factory new parts; factory-identical tools, fixtures and gauges; modernization overhaul procedures — all these make Airwork overhauls costly *at first.* But they *save money for you during the operating life of the engine.*

On September 8th, the Airwork-Pratt & Whitney Aircraft Forum will be held in Millville. Why don't you attend and see why Airwork engines cost less to operate?

Airwork

Airwork CORPORATION

Millville, New Jersey

or less so the instrument could be used on an assembly line if required. The article is set up for test in exactly the same way as for the Spectrograph, using the same multisource.

The light from the grating passes through pre-selected secondary slits onto mirrors that deflect the light onto photo multiplier tubes. These are calibrated for pre-selected channels for each element and the Quantometer records the amount of all elements individually in one excitation. The integrated output of the photo multiplier tubes is amplified and recorded to show the intensity of the spectral line.

By proper standardization of the instrument, the recorder response will indicate the percent concentration directly for each element. Upon completion of the cycle, the instrument is automatically reset and ready for another analysis.

Spectrophotometers

The infrared Spectrophotometer is an electronic device used primarily for qualitative and quantitative measurements of various constituents in organic materials. Infrared absorption spectra can be used for the identification of pure substances or for the detection and identification of impurities.

There are more applications in the organic field than in the inorganic field primarily because water, the chief solvent for inorganic compounds, absorbs strongly beyond the infrared spectrum of about 1.5 microns.

For the identification of substances in the pure state it is necessary only to compare the spectrum of the unknown with the spectra of the various possible substances. Usually, enough is known about the origin or the nature of the unknown substance so that a limited number of possible substances will be suggested to the analyst. When a match between spectra is obtained, identification is complete.

Oils, greases, solvents, etc., are tested quickly and the results plotted on an automatic recorder.

This graph is compared with the graph of a standard known sample, and the analysis is made.

The Beckman Model DU Quartz Photoelectric Spectrophotometer (see photo, p. 59) is an instrument with a wide spectral range for use in the identification and determination of all types of chemical substances. It is used in applications demanding accuracy and dependability with great versatility and ease of operation.

The instrument permits measurements in the wave-length range from 320 to 1,000 millimicrons—with the ultraviolet accessory attachment, measurements down to 220 millimicrons are possible.

In operation, the light from a lamp is focused on an adjustable slit by mirrors. The light rays strike the collimating mirror and are reflected toward the prism. The monochromatic light then passes through the absorption cell into the photo tube, where it is amplified and measured directly as percentage of transmitted light. This method of analysis is known as absorption spectral determination.

For many substances infrared or ultraviolet radiation sources are required. The flame Spectrophotometer, for example, utilizes a flame instead of a lamp as a light source. The sample in liquid form is atomized into this flame, which in turn excites the elements in the sample, causing them to emit radiations of various wave lengths. The measurements of these emissions identify and determine the amounts of the elements.

Small Rectifier

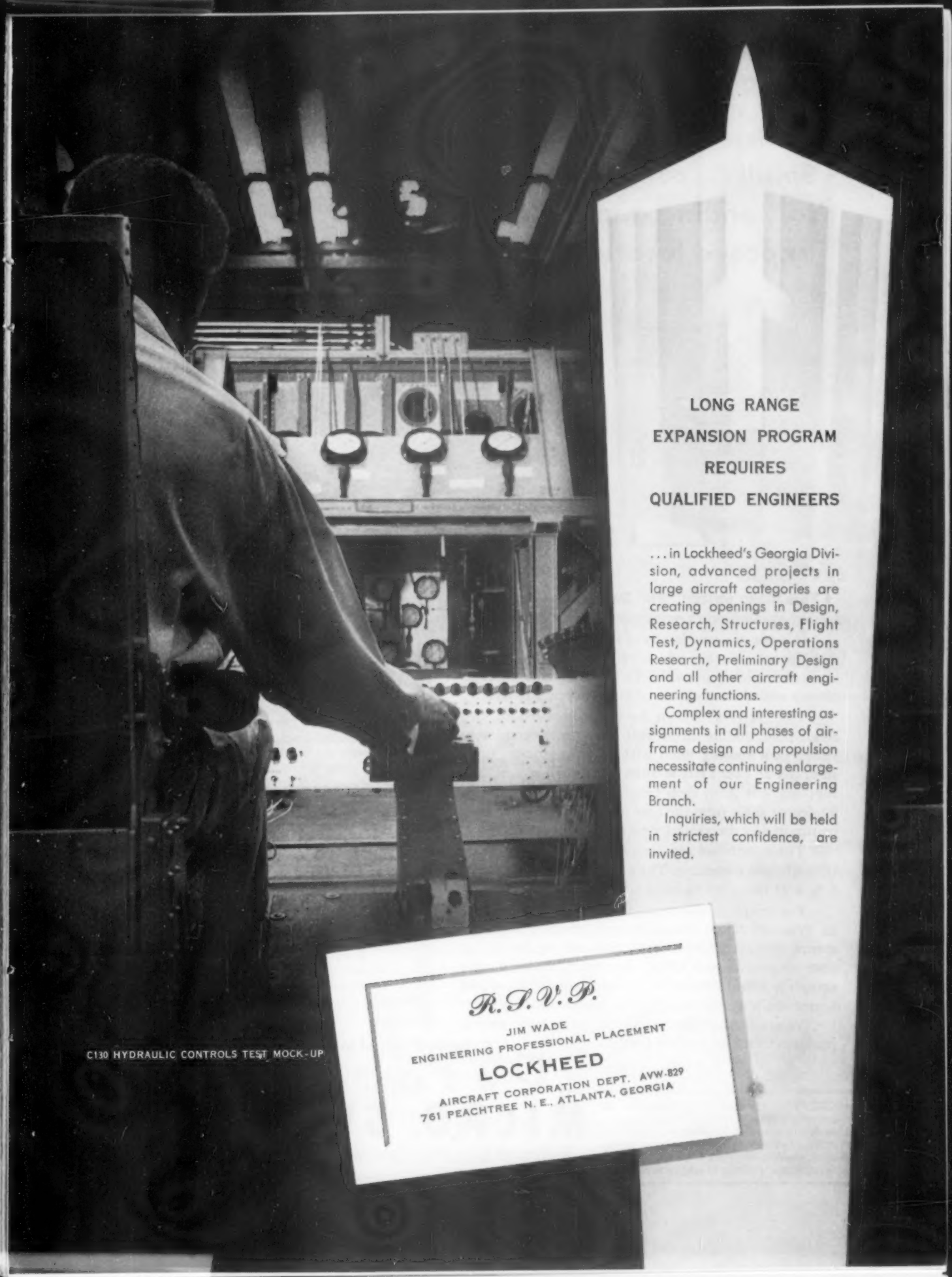
Pea-size silicon rectifier, developed by Bell Telephone Labs, has current-handling capacity equivalent to the seven large selenium rectifiers in the background and an efficiency greater than 98%, Bell says. New device is expected to have almost unlimited life at temperatures up to 400F.

FILTER CENTER

► **R-W Narrows Site Location**—Choice of sites for the Ramo-Wooldridge Corp.'s new manufacturing facility, the company's first, has been narrowed down to three areas: Denver, Dallas-Ft. Worth, and Albuquerque. Facility will manufacture both military and commercial computer-automation systems developed within the company.

► **New Short-Pulse Radar**—A new small lightweight X-band radar, employing a pulse only 0.02 microseconds long which makes possible target range definition to 10 feet or better, has been developed by Litton Industries. The new radar appears particularly attractive for application to low-altitude radar altimeters, flare-out path adaptors, aircraft station-keeping problems and missile firing error detectors. A radar altimeter employing the new techniques reportedly would weigh only 19 lb. and occupy 0.33 cu. ft.

MICRO SWITCH Precision Switches



C130 HYDRAULIC CONTROLS TEST MOCK-UP

LONG RANGE EXPANSION PROGRAM REQUIRES QUALIFIED ENGINEERS

. . . in Lockheed's Georgia Division, advanced projects in large aircraft categories are creating openings in Design, Research, Structures, Flight Test, Dynamics, Operations Research, Preliminary Design and all other aircraft engineering functions.

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LETTERS

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*Here's a **NEW** concept in airborne switches—*

Small . . . completely sealed . . . cylindrical switch for landing gears, flaps and other exposed locations

• This MICRO SWITCH "**EN**" Switch has greater versatility than switches many times its size and weight.

It is one of a new family of MICRO SWITCH environment-proof switches which offers aircraft designers unusual flexibility in switches whose elements are completely sealed from effects of atmospheric changes.

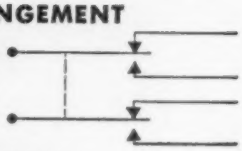
The "**1EN1-6**" shown here is composed of two single-pole, double-throw switching units completely sealed in a housing filled with inert gas under pressure. Six 20-gauge **MIL-W-5086** leads, six feet long, are supplied, one from each terminal. These project at a 90-degree angle from the base of the switch. They may be run in any direction by rotating the switch.

These switches are designed for bracket type or through-hole mounting. The plunger operates through a ⅜ x 24 threaded bushing one inch in length.

For complete information on the new "**EN**" switches, types of rotary actuators and circuitry developments, contact MICRO SWITCH Engineering Service at your nearest branch office. Let them show you the complete MICRO SWITCH line of environment-proof and hermetically sealed switches for severe airborne service. You will find that it pays to bring your switch problem to MICRO SWITCH first.

CIRCUIT ARRANGEMENT

• Circuit is double-pole, double-throw. The wiring diagram and terminal designation are shown on the side of the switch.



ELECTRICAL RATING
(at 30 volts d-c)

INRUSH
Normally-closed, 24 amperes
Normally-open, 24 amperes

AT SEA LEVEL
Resistive, 4 amperes
Inductive, 3 amperes
Motor, 4 amperes

AT 100,000 FEET
Resistive, 4 amperes
Inductive, 2 amperes
Motor, 4 amperes

A complete line of snap-action switches for aircraft

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches and mercury switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

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LETTERS

Aviation Week welcomes the opinion of its readers on the issues raised in the magazine's editorial columns. Address letters to the Editor, Aviation Week, 330 W. 42 St., New York 36, N. Y. Try to keep letters under 500 words and give a genuine identification. We will not print anonymous letters, but names of writers will be withheld on request.

Nonskeds Defended

Reading your editorial of July 25, 1955, I became disturbed over one paragraph which reads:

> North American was interested only in the high density traffic routes where by price cutting it could skim some of the cream from the existing air transport market. It had no responsibility to serve less profitable points that are part of the "public convenience" a responsibility shouldered by certificated airlines.

These words implied to me that you were swallowing a "cream" argument without much consideration of the merits of the argument. The non-scheduled airlines are accused of neglecting the short hauls in favor of the more profitable long hauls. But, as I pointed out at a recent oral argument before the Civil Aeronautics Board, this concentration on long hauls, with the consequent reduction in long haul fares especially for the many passengers with moderate incomes, was and is one of the greatest contributions to civil aviation made by the non-scheduled carriers.

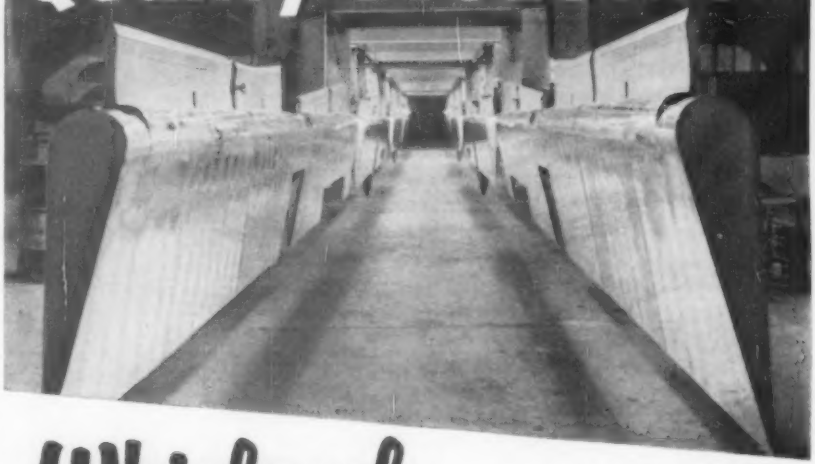
The most important passenger of the airline is the traveller who has to go a long distance in a short time. The Washingtonian who wants, or needs, to get to California—or to Florida—is a more promising and dependable air passenger than the Washingtonian who flies to Philadelphia.

Before the independent carriers initiated coach services, the trunk airlines were charging the long haul passenger more per mile than the short haul passenger. Yet, as you know, it costs an airline less per mile to transport the long haul than the short haul passenger. The trunk airlines were, therefore, overcharging the long haul passenger in order to subsidize their short haul passengers. A correction of an uneconomic maladjustment in the fare structure is scarcely "cream skimming."

The airline industry's development can be best effected by catering to, rather than penalizing, its best customers. The trunk airlines apparently blame the non-scheduled carriers for not being the kind of merchandisers who try to sell the customer something for which he has relatively little need. And they criticize the non-scheduled carriers because they have succeeded in giving travellers with moderate incomes something they much need and are not yet adequately furnished.

It is argued by some that income from the fat routes is necessary to defray losses incurred on the lean routes. This is just another way of saying that the trunklines

Here's Your Source for Low Cost, High Quality Production



B-47 ailerons in production at Whirlpool for Douglas Aircraft Company, Inc., and Lockheed Aircraft Corp.

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On your next airframe subassembly job it will pay you to see Whirlpool *before* determining your production source. Whirlpool has complete modern production facilities . . . experienced engineering talent . . . and most important, a proven record of delivering *high-quality* at *low cost*. At Whirlpool you have over 65 years of manufacturing know-how.

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FUEL SYSTEM ICING STOPPED!

"Heat the fuel going to each engine." That's what petroleum experts told design safety engineers working on icing problems in the fuel system as encountered in flight conditions of a long range, multi-engine bomber.

The oil used in jet engines is of the non-congealing type. It is common custom to dissipate jet engine oil heat by transferring the heat to the cool jet engine fuel through the medium of fuel-oil heat exchangers. But to apply the same principle to the comparatively easily congealed oil used in reciprocating engines raised problems for which there was no precedent. Engine fuel temperature had to be raised above the icing stage to overcome icing of contained water in the fuel without congealing the oil. Converting the Hi-D type of fuel-oil heat exchanger, used on jet engines, to application on reciprocating engines meant putting the hot oil next to the cold fuel in the same envelope. Would the oil heat the fuel before the fuel congealed the oil?

UAP engineers had the answer to applying —65°F. air to reciprocating engine oil 26 years ago. But this deal of putting hot engine oil to warming —65°F. liquid was something else. That in itself meant a vicious decrease in the flowability of the oil. Pressures, too, were different. Our engineers had to dig deep into their bag of heat exchanging "know-how" to make these new conditions acceptable. The application of the UAP Hi-D principle of controlling liquid flows gave us the edge over all other interested manufacturers of aircraft heat exchangers.

Our solution is wrapped up in a diffusion-type heat exchanger and control assembly of 6.2 pounds dry weight, and 11.4 pounds wet weight, heating the maximum fuel flow of 2600 pph from —65°F. to 70°F. Total amount of heat transferred at this condition is 2680 BTU per minute at 2600 pph fuel flow and oil pressure drop of 6.5 psi at 130 ppm. The maximum fuel pressure drop is 0.15 psi at 2000 pph permitting the engines to continue to operate without boost pumps when required. A modulating control unit, integral, prevents the fuel temperature from ever exceeding 80°F.

Hi-D Principle of Liquid Flow Control Solves Water-in-Fuel Problems

What has been done so successfully by UAP engineering "know-how" for reciprocating engines can now be applied to fuel systems for turbo-prop engines. A heat exchanging frontier has been penetrated and new horizons established. Let UAP "know-how" prescribe the correct Hi-D heat exchanger for your turbo-prop fuel/oil systems.

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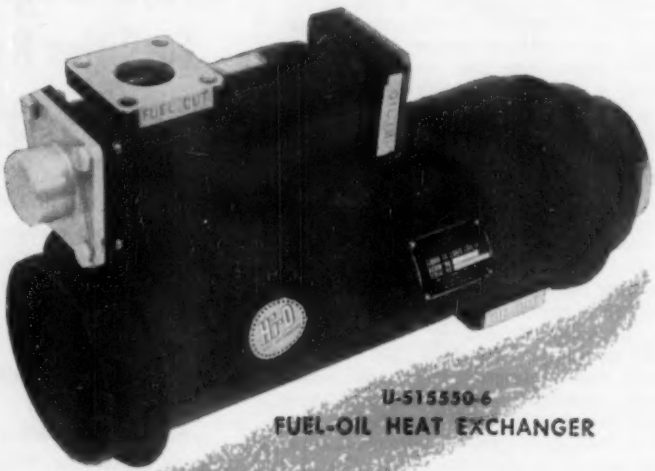

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FUEL-OIL HEAT EXCHANGER

a famous family of aircraft essentials

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earn fat profits on the long haul passenger in order to carry the short haul passenger on a lean margin in competition with railroads and buses. "Lean" routes are not necessarily "loss" routes. No doubt, there are some cities on trunkline routes which may not yet be profitable. Such cities are, in large number, being turned over to local service airlines (over the protests of the cities, too). If there are loss cities where air transport must be provided, that service should be subsidized. Whatever subsidy is allowed, however, should be clearly and cleanly stated and not mixed up with "fat" "lean" and "cream skimming" arguments.

I have written at some length because it seemed that you have not considered the foregoing factors. In the *Large Irregular Investigation* (C.A.B. Docket No. 5132) numerous tables supporting the facts set out above were received in evidence.

ALBERT F. BEITEL
Morris, Pearce, Gardner & Pratt
American Security Building
Washington 5, D. C.

(Mr. Beitel represented the Air Coach Transport Association, of which North American Airlines is a member, in the Large Irregular Carrier investigation by the Civil Aeronautics Board—Ed.)

Red Plane Photos

Congratulations on your editorials, particularly those on censoring of photos of recent Russian Aircraft.

We of the Capt. McConnell Post GOC, at Dover, N. H., have done all we could with photos and clippings from your magazine to make up posters and placing them on display at nearby store windows, to better reach the public.

I believe if the public was more fully aware of how vulnerable we are from the air, our job recruiting volunteers for the GOC wouldn't be half so bad.

We sincerely hope you keep up the good work on printing information about the Red air force.

GILBERT V. DOLLOFF
232 High St.
Somersworth, N. H.

High-Density Revisions

You state in your July 18 edition (p. 23) in respect to the establishment of a High-Density Area Traffic Zone at Washington, D. C.: ". . . the CAA has decided to go ahead with the plan".

It is true, as you state, that the project was held up by the Aircraft Owners and Pilots Association, whom I had the privilege of representing at the public hearing.

I think it is important for the many thousands of supporters of the Association to know that the plan that the CAA is going ahead with resembles the original plan just about the way the successful Sikorsky helicopter resembled Leonardo's theoretical sketches of his dreams along that line.

You mention ". . . the CAA has exempted certain limited areas south of Washington . . ." to meet the needs of light plane operators. There were several additional differences between the CAA's original proposal and the plan it is now going to try

(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

Members of Whittaker's busy Field Service Group of the Field Engineering Department have a tidy thumbnail description of their job: **"We are responsible," they say, "for the care and feeding of all Whittaker products after they are delivered to the final customer."**

It's a world-wide operation, and it keeps a crew of experts hopping to stay ahead in the three major fields of publications and technical data, spares, and re-work and overhaul, plus the detective work required in trouble shooting anywhere on the globe.

Tom Loughan, veteran head of the group, and Jim Myatt, his assistant, are Whittaker's top investigators in trouble shooting, backed by field service engineers in various areas of the country.

When an emergency arises, no one knows just where the responsibility lies, and no one cares at the outset. The big job is to find the trouble and fix it. Responsibility can be pinned down later. And in the pinning, these tech reps – and those of all the other plants with whom they work in close and friendly cooperation – are remorselessly honest in their widely-distributed reports, calling their shots exactly as they see them.

These men are roving representatives, spending more than 35 percent of their time in the field. They "drop in" at air bases and Air Materiel Areas just to check on things, and they're always welcome. They follow UR trends closely in "preventative analysis," peg a problem quickly as "local" or "general" and dig into it to find the answer as quickly as possible.

Occasionally a valve is to blame, but more frequently a malfunction is traced to contributing factors such as the unit that failed because it was clogged by aluminum shavings – or the actuator that was burned out by a ground test rig that energized both sides of the armature simultaneously!

Jack Kelty's section within the Field Service Group is responsible for all publications and technical data relative to Whittaker products, a vital adjunct to maintaining efficiency in the field.

The task includes production of all pertinent technical orders, maintenance manuals, drawings, bulletins, letters, all correspondence on the data side, anything to do with "care and feeding" as distinguished from price and sales. Requests for technical info, field experience, etc., come from all over the world, and it's up to Kelty and his crew to root out the answers.

Frank Cockings' section is concerned solely with spares, but don't let the word "solely" mislead you. It's a complex and highly specialized job of keeping parts provisioning breakdown lists, code and serial sequences, revision and change order schedules, full descriptions of each and every tiny part used in the company's valves, together with Whittaker's special recommendations for economical parts ordering.

Painstaking records must be kept of quantities of spares required for hundreds of different valve types as well as quantities of overhaul components. Orders must be reviewed and checked for accuracy to be sure a customer hasn't ordered more than he can use. Above all, the overhaul agencies must be protected to be certain they have the right parts at the right place at the right time.

This section, too, is charged with preparing spares and parts orders under the weapons system concept, calculating what will be needed where and when under a virtual "blank check" procedure with major customers.

Another responsibility of "spares" is to keep a complete historical record of everything the Field Service Group does month by month throughout the years.

Re-work and overhaul, headed by Andy Berasley, handles all customer relations in these two categories and deals in a mountain of paper work annually. Each of an average 6000 orders a year requires at least ten forms or pieces of correspondence — 60,000 sheets of paper work in a dozen months — not to mention a continuous run of long distance phone conversations and wires linking Andy with customers across the nation on re-work and overhaul business.

The operations of field service from on-the-spot detective work in trouble shooting to analysis of orders for possible over-purchase are financed solely by Whittaker as a service to its customers. The result? A mutuality of appreciation, understanding and cooperation that cannot be topped.

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(this advertisement appears every week)

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experimentally for the 116 day period, Aug. 1st to Nov. 24th.

In the first place, the prior experimental period, as we understand it, was to have been a year, and the reduction of this to approximately 4 months is in itself helpful to aviation in the Washington Area should the plan prove dangerous or unduly burdensome.

Secondly, the original plan proposed to forbid the entry into the zone of any VFR traffic, if it were not destined to or departing from an airport within the air space. This has now been dropped from the plan and thus probably its most onerous and useless feature has been removed.

Next, it was proposed that the tower operator, at his discretion, might close the Washington Zone to any VFR traffic despite the existence of VFR conditions. This also has been removed from the plan.

Indeed, remaining in the plan are only two of the original proposals: Firstly, that traffic within the Zone maintain constant two-way radio liaison; and, secondly, that it remain under 180 miles an hour airspeed.

It would be untrue to say that in theory AOPA is not opposed to the additional zone, but as a practical matter, inasmuch as the most unacceptable portions of the proposal have been removed, a refusal to cooperate with the Administrator now in this watered down proposal might be classified as "nit-picking."

ALFRED L. WOLF
Wolf, Block, Schorr & Solis-Cohen
12th Fl. Packard Bldg.
Philadelphia 2, Pa.

Rx for Congestion

Your editorial on the Air Traffic Control Problem in your Aug. 6 issue does not mention what is quite possibly the most promising solution of the airport congestion problem. This is the convertiplane.

Possibly you are not aware of the fact, as particularly pointed up by NACA Technical Note 3304, that with the advent of the turboprop engine it becomes possible to produce transports of over 350 mph. that are capable of vertical take off and landing without material impairment of speed, range or load capacity.

The development and certification of such aircraft is of course a process involving considerable time and their use as a solution of the airport problem must therefore be considered a long range one. However, the solution when attained is such a satisfactory one and the benefits to air transportation so great in other ways, that acceleration of convertiplane development should enlist, it would seem, the active efforts of all interested in the future of aviation.

HAVILAND H. PLATT, M. E.
Engineering Consultant
19 East 53rd St.
New York 22, N. Y.

(AVIATION WEEK follows convertiplane, as well as all other new aviation developments, closely. An analysis of the VTOL transport model test flown by NACA scentists as part of their research into vertical-rising aircraft appeared in our June 13 issue.—ED.)

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The high-winged C-123 Assault Transport is a perfect teammate to the twin-boomed C-119 Flying Boxcar.
Especially designed for safe, swift air-landing or para-dropping of men and material at advanced bases, the C-123 brings new mobility to tactical air support under any conditions of climate or terrain.
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Enlist to fly in the U. S. Air Force
"Where the future is measured in light-years"

First Royal Gull Executive Plane Ready to Make Market Debut

Milwaukee—The first Royal Gull, only twin-engine amphibian now in production in the U. S., is being completed here after a $300,000 six-month-long redesigning period.

The first of the Italian-built five seaters, which have a retail list price of $74,500, f.a.f. Mitchell Field, Milwaukee, already has been sold to the Vest Aircraft and Finance Co., of Denver, its distributor in 11 Western States, Alaska and Mexico.

The Gull's components, built by Piaggio & Co., Genoa, are shipped to Milwaukee for assembly and installation of American engines, propellers, radio, instruments and accessories. Royal, however, has reserved the right to manufacture the entire plane in the U. S. if it becomes impractical to obtain the components from Italy. Current schedule calls for completion of two Gulls a month.

Recent changes in the aircraft's design, requested by Royal for its American market, include:

- **A second step in the after hull** to facilitate dead calm water takeoffs.
- **Enlarged fin and rudder** area and increase of rudder throw 10 deg. each way for better single-engine flight characteristics.
- **Movement of hydraulic system** oil and air connections from cockpit to left wheel well for greater accessibility.
- **Relocation of exhaust stacks** to nacelle side to reduce cabin noise and keep cold water from spraying hot stacks when in operation.
- **Improved insulation** to lessen engine noise transmitted through main wing spar.

Performance Features

Tubing in the Gull will use standard AN fittings and all but the main wing and landing gear attach bolts will be changed over to AN nuts and bolts.

Other design and performance features:

- **Engine cooling.** On a demonstration flight with Wallace F. Watson, Royal's chief pilot, cylinder head temperatures stayed within limits at all times. Ambient temperature was 90F.
- **Water maneuverability.** Rudder is mechanically retractable for better water handling. The plane can be kept under complete control with one engine inoperative.
- **Proportional wing flap hydraulic control.** Cockpit handle moves flaps to quarter, half, full down or intermediate settings. Flaps move at the same speed as the control handle.
- **Hand-operated, built-in bilge pump.** Any of the plane's four watertight hull compartments can be drained of accumulated water.
- **Italian hydraulic brakes.** Effective wet or dry, they do not chatter when wet, the maker reports. Wheel bearings are sealed to keep out water and sand.
- **Wide engine cowling opening** above and below the wing facilitates change of cylinders or accessories.
- **Right windshield** is hinged along centerpost. Co-pilot can swing plastic closure open for access to anchor stowage compartment and pilot can help in the docking and mooring of the plane.
- **Forward hull intake vents** and after fuselage exhaust vents keep explosive gas fumes from accumulating in the hull.

The Gull is not a protoptype aircraft. The current model P.136.L.1—with a cruising speed of 164 mph. (at 70% METO power, 8,000 ft.—is a development of a design used by the Italian Navy for over three years.

The two aircraft being used by Royal as company plane and demonstrator have a combined total of 500 flying hours. The planes have experienced three malfunctions thus far—a burned out hydraulic pump solenoid, a fuel pump drive shaft failure and a worn brake biscuit on one of the planes at 170 hours.

Standard Equipment

Standard equipment on the new executive plane includes Stewart-Warner South Wind 20,000-Btu. combustion heater, dual flight controls and brakes, windshield defrosters and Grimes "eyebrow" instrument lighting. Instruments for night and bad weather flying also are included.

Powerplants are Lycoming GO-480-B1 engines each of which develops 270 hp. on takeoff. Three-bladed, constant-speed propellers are full-feathering, all-metal Hartzells of 84 in. diameter.

Here are the details of the Gull's operating systems:

- **Hydraulic.** An electrically driven Pesco 0.5 gpm., 1,500-psi. pump supplies normal hydraulic pressure. An automatic pressure switch cuts in when system pressure drops to 1,280 psi. to start the motor for pressure buildup. Accumulators for the main system and the brake system are provided.

The hydraulic system operates the main and tail landing gear retraction, wing flap control and normal and parking brakes. Main gear retracts into the side of the hull; the tail wheel rotates 180 deg.

An emergency hand pump and a separate emergency main landing gear lowering system are provided. The tail wheel is not lowered when this system is used but a skid plate at the bottom of the rear hull helps to stop the plane.

A check valve isolates the brake hydraulic system from the main system.

The brakes remain operative so long as pressure remains in brake accumulator even if the main system fluid is lost.

- **Electrical.** Two engine-driven 24-v. generators rated at 50-amp. normal and 100-amp. momentary overload capacities feed the system. Two 12-v. batteries, more available than 24 v. at executive plane service bases, and 10 lb. lighter, are mounted in the forward hull.

All switches also serve as circuit-breakers. Landing lights are mounted in the wing's leading edges.

- **Heating and ventilating.** A common

THE SLEEK NEW USAF MARTIN B-57 TACTICAL BOMBER IS EQUIPPED WITH THE ARO 5 LITER LIQUID OXYGEN CONVERTER

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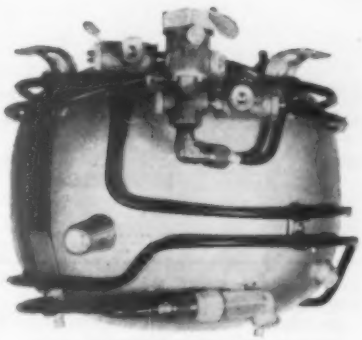
This is typical of many ARO contributions to aviation progress . . . with world leadership in the design, development and manufacture of oxygen equipment. Leading aircraft builders today depend on Aro for a growing number of precision products. For further details write:



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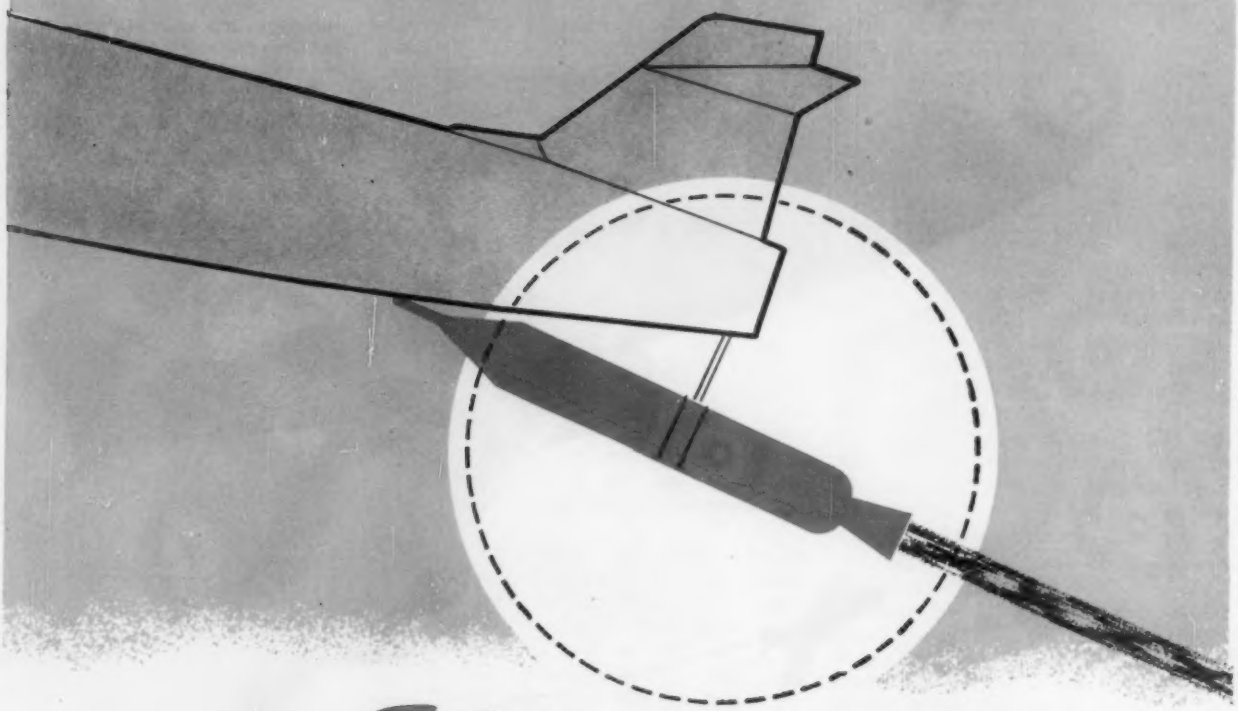
Focus on the Booster for Zero-length Launching



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Much attention has recently been focussed on boosters required to launch missiles and aircraft in zero-length. "Thiokol" rocket motors can deliver the high performance required of boosters for these systems.

With "Thiokol" rocket motors, a broad range of thrust level and duration is available to fit virtually any zero-length launching system. The motors are practical for field use. They are of simple and rugged construction and will withstand rough handling, aging and temperature extremes without impairment of performance characteristics.

Advanced rocket motors suitable for zero-length launching are among the many achievements resulting from coordinated chemical research, design, fabrication, development testing and manufacture conducted by Thiokol's rocket development and manufacturing team.

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ALL TYPES OF ROCKETS	GAS GENERATORS
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Become a member of Thiokol's rocket development and manufacturing team! We welcome inquiries from mechanical engineers, chemical engineers and chemists interested in the rocket field.

Thiokol projects include participation in development programs on the Hughes "Falcon" and many other classified projects.

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Elkton Division, Elkton, Md. • Redstone Division, Huntsville, Ala. • Longhorn Division, Marshall, Tex.

Cowl Aids DC-3 Speed

Cruise speed increase of at least five knots is expected for Sears, Roebuck executive DC-3 fitted with new engine cowls that have frontal area of 30 in. compared with 38-in. for standard cowls. The streamlined cowlings are also said to improve engine cooling by reducing interior turbulence. A five knot gain was experienced with the DC-3 fitted with one prototype and one production version of the cowl, which is made by Miner's Aircraft & Engine Service, Inc., 8165 First Avenue South, Seattle, Wash. New cowling has been approved by Civil Aeronautics Administration after two-week flight test.

set of ducts is controlled by a four-way valve in the cockpit.

For cooling, air is drawn through a screened intake at the base of the left wing's leading edge and forced through a combustion heater (which is off) to four individually-controlled outlets in the cockpit's baseboard. Additional cold air is ram-fed to two swiveled air outlets at each end of the instrument panel.

Combustion heater hot air can be directed to the engine through the four-way control valve for pre-heating in cold weather.

It is estimated that a 30-40 minute warm up for each engine is sufficient in all but extreme arctic conditions under this system, hot air is blown directly onto the cylinder of the aircraft's engine.

• **Fuel.** Two 95-gal. tanks are mounted in the center fuselage on the plane's center of gravity so that longitudinal trim remains unchanged as fuel is consumed.

Two engine-driven fuel pumps feed gasoline to powerplants. Crossfeed allows one pump to serve both engines in the event that the other pump should fail.

When a fuel pump broke on one of Royal's Gulls, the company felt that the fuel pressure supplied by the remaining pump was marginal. Gulls, therefore, will be equipped with two electrically driven booster pumps to assure adequate fuel pressure under emergency conditions.

• **Vacuum.** Two engine-driven vaccum pumps supply low pressure to drive the plane's gyro instruments.

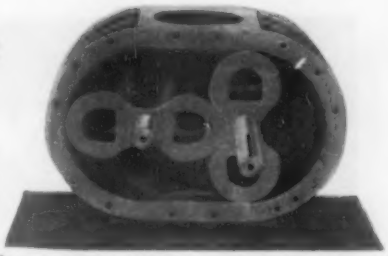
• **Cockpit.** Pilot's and co-pilot's seats are adjustable and rear seat comfortably accommodates three men. Large windshield and windows provide good visibility.

The aircraft's flight controls are of the push-pull type located on the instrument panel.

The landing gear control knob is in the shape of a wheel; wing flap control knob is patterned after an air foil for easy identification. The forward baggage compartment (behind the rear seat) has a 120-lb. capacity; the rear compartment (in aft hull) can hold 300 lb.

Francis J. Trecker, president of Kearney & Trecker Corp., which owns Royal Aircraft, already is thinking of a larger, faster amphibian if the Gull proves successful.

Both the Mexican Air Force and Navy have expressed interest in the plane during a recent demonstration of the Gull in Mexico City as part of the company's sales campaign.



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Provides a 3′ by 6½′ safety steel platform with guard rails at exactly the right height for maximum efficiency. Plenty of room for tools and freedom of movement. Easily positioned by one man, hydraulic lift operates like an elevator. Attachments available for motorized towing. Capacity 500 lbs. Model D4 service range 3′ to 7′. Model D5 service range 7′ to 12′.

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KNOW YOUR DOORMAKER!

Trust TRUSCON to build big doors for the big ships

Truscan Motor Operated Straight Slide Hangar Doors
Detroit Wayne Major Airport, Detroit, Mich.
Giffels and Vallet, Inc., architects.
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These Straight Slide Steel Hangar Doors recently installed at Detroit Wayne Major Airport give new proof that Truscon knows how to build the big ones. Republic's Truscon Steel Division makes doors to fit every need, every size of opening. Each is the product of nearly thirty years' specialized experience in big door design and manufacture.

The success of every door installation requires just such experience. Hangar doors are no job for amateurs. Coping with the demands of these big jobs requires sound engineering knowledge, design experience, plenty of background in the field, skilled fabrication and big ideas. Truscon offers this type of seasoned thinking to you.

High, wide, quick-opening Truscon Steel Doors help get the big ships in and out fast. You choose from a variety of proved types, fitted to all airport service and climate conditions. Truscon designs include Straight Slide Doors, Vertical Lift Canopy Doors, Braced and Unbraced Canopy Doors, Tail Doors. Truscon Door engineers and field crews will help you apply the proper design and type to the job at hand. For facts, send coupon.

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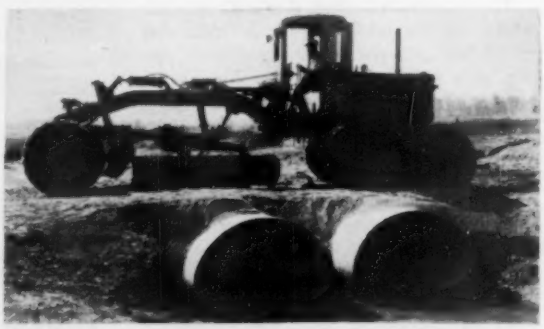
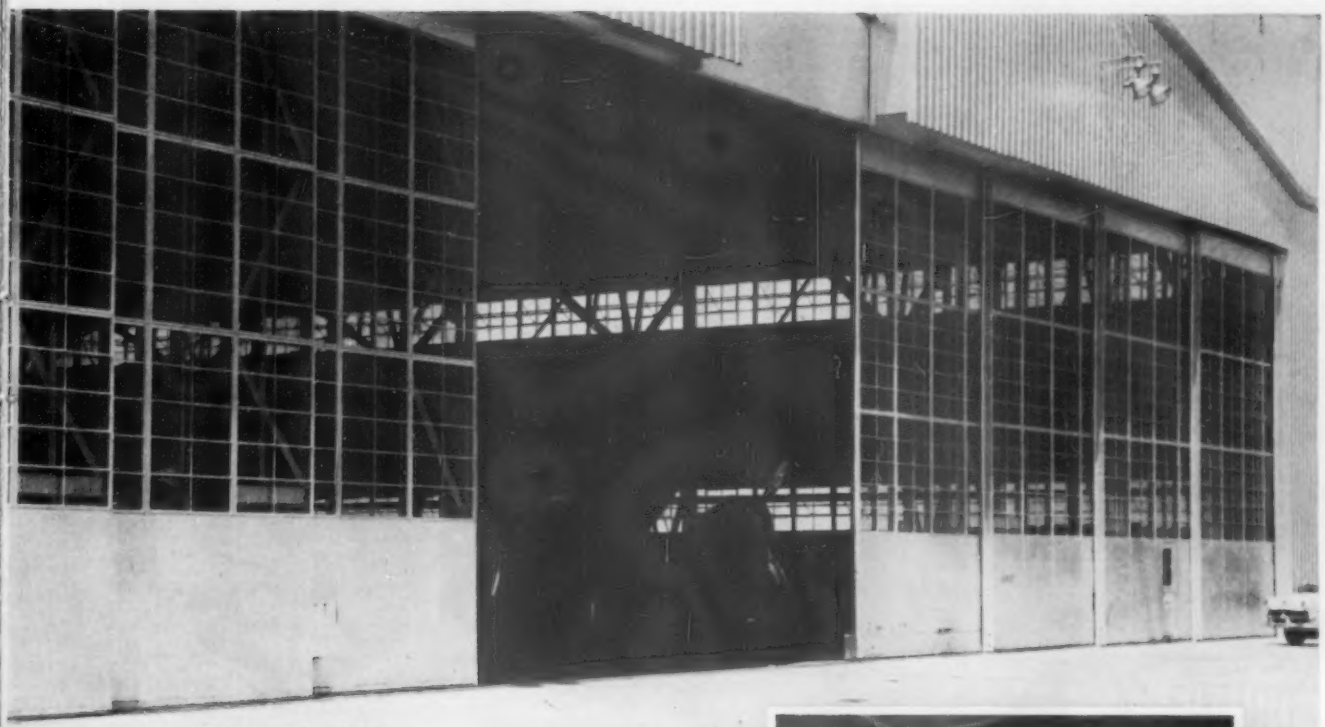


Another Republic product handles runway drainage. It's Republic Sectional Plate Pipe-Arch, made of Republic Toncan Iron or Republic Copper Steel—most rust-resistant ferrous materials in their price class. Republic Toncan Drainage Products offer years of trouble-free drainage service. Send coupon for name of Toncan Iron Drainage Products fabricator nearest you.



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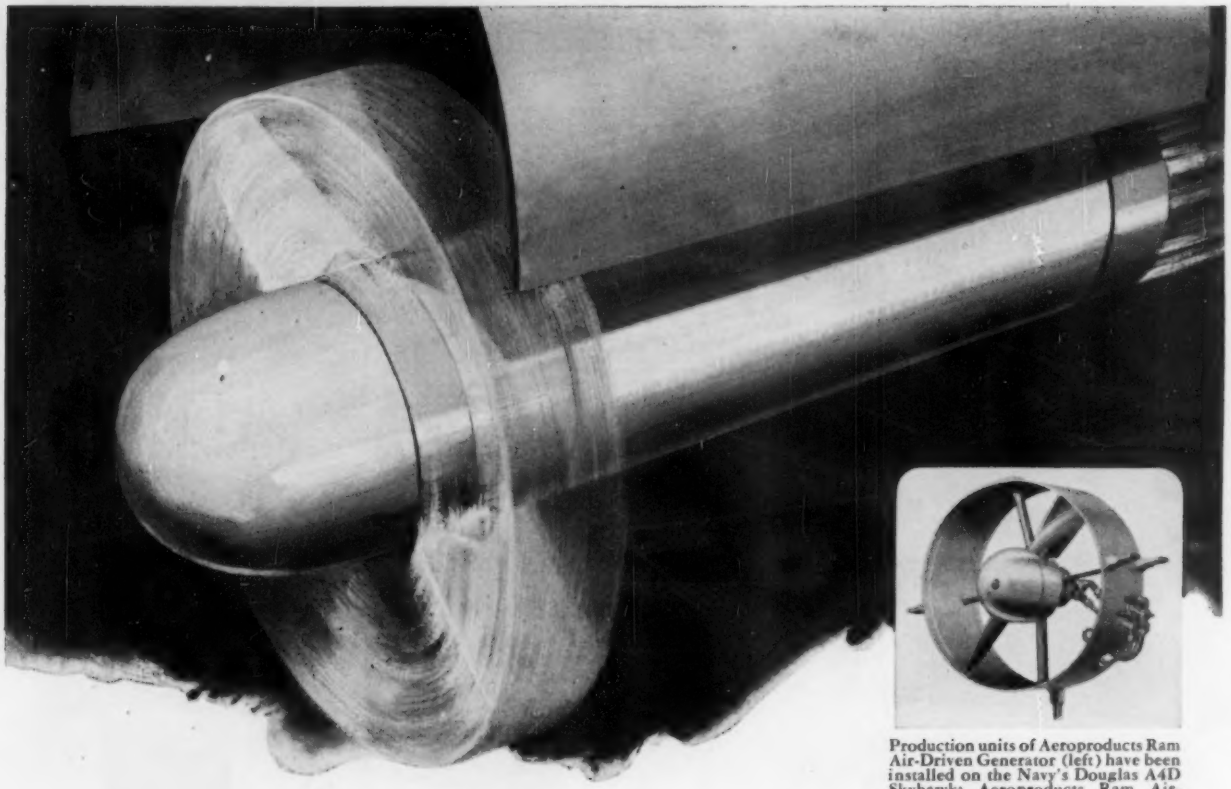
UNITED AIRLINES GOES VISION-VENT. The new Finance and Property Building of United Airlines, Midway Airport, Chicago, is built with Truscon Vision-Vent Window Walls. Vision-Vent is a complete prefabricated window with insulated panels. It incorporates all the mass-production and installation economies of standard steel windows. For airport administration buildings, passenger facilities, waiting rooms, warehouses and other service establishments, ask your architects about Truscon Vision-Vent. Send coupon for more facts.

PLANNING LONGER RUNWAYS? Be sure to specify Truscon Steel Reinforcing Bars for crack-resistant concrete construction. Truscon pioneered in the development of concrete reinforcing, now offers immediate delivery of deformed steel reinforcing bars and welded wire fabric out of warehouses located coast to coast.



Production units of Aeroproducts Ram Air-Driven Generator (left) have been installed on the Navy's Douglas A4D Skyhawk; Aeroproducts Ram Air-Driven Hydraulic Pump (above) is scheduled for installation on jet fighters.

Emergency Power in Seconds--

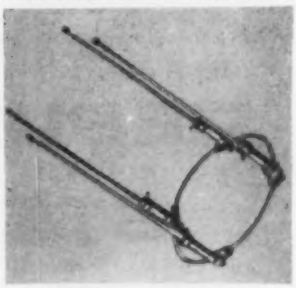
Electric or Hydraulic!

AEROPRODUCTS AIR-DRIVEN GENERATORS AND AIR-DRIVEN HYDRAULIC PUMPS GIVE POWER INSTANTLY TO FLY AND LAND A PLANE SAFELY

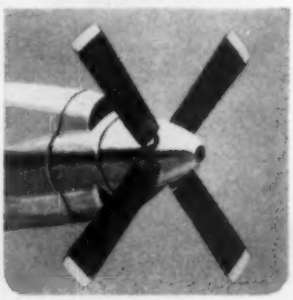
Aeroproducts has the answer to your requirements for emergency sources of electric and hydraulic power—ram air-driven emergency generators and hydraulic pumps.

In less than two seconds, Aeroproducts ram air-driven generators develop sufficient power to operate flight control surfaces and cockpit instruments necessary to fly and land a plane safely. Also, within this time, Aeroproducts ram air-driven pumps produce sufficient hydraulic pressure for the flight controls.

Aeroproducts also is ready *now* to meet your most demanding specifications for turbopropellers, propellers requiring high horsepower absorption, actuators, and other aircraft components now under development. Call or write us for details.



Actuators for Afterburners



Turboprop

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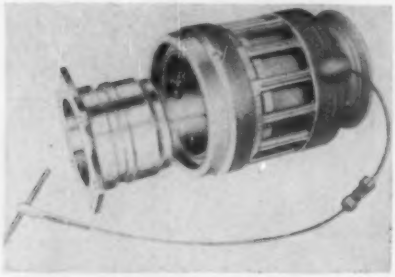
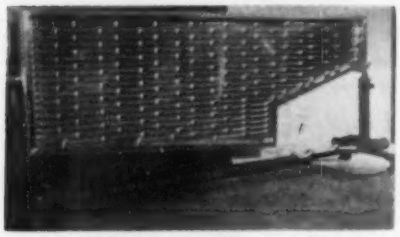


Air-Start Coupling and Hose

Air-start coupling provides two methods of disconnect: lanyard and manual. Coupling may be connected to a nipple either by rotating the collar to the lock position or by skinning the collar back as on lanyard disconnect. Air-start couplings were tested satisfactorily to the following pressure requirements: operating—100 psi, 700 F.; proof—175 psi, 700 F.

Hose can be run over by rubber-tired vehicles without damage and can be packaged into small container units. Hose meets pressure requirements of 75-psi. operating, 150-psi. proof and 225-psi. burst pressures. It is rated for 550 F. operating temperature. Operates under all weather conditions and remains flexible at —120 F.

Roylyn Inc., Glendale, Calif.



Simulates Aerodynamic Heating

Portable radiant heat unit for aircraft structural testing is capable of producing approximately 20 deg. F/sec. heat rise on certain aircraft skin surfaces. It utilizes 162 quartz infrared heat lamps that consume nearly 400 kw.

Originally designed for studying a particular aircraft wing section's response to a transient heat cycle, the unit can also be used to simulate aerodynamic heating effects resulting from flight at supersonic speeds.

Cook Research Laboratories, 2700 N. Southport Ave., Chicago 14, Ill.

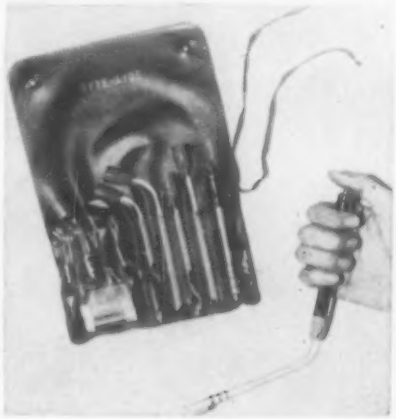
Ultrasonic Cleaners

Used for cleaning nuclear parts and armatures, new ultrasonic devices have stainless steel basins with diameters ranging from 4 to 12 inches.

The cleaner unit consists of cabinet which houses a generator of high-power electrical energy and a transducer or cleaning unit which holds cleaning solution and converts electrical energy into high-frequency sound. The device transmits specially selected sound waves which "boil up" the water detergent solution to achieve high penetration of the part to be cleaned.

Complicated mechanisms may be cleaned without disassembly.

Pioneer-Central Division, Bendix Aviation Corp., Hickory Grove Rd., Davenport, Iowa.



Multi-Purpose Light Kit

Inspection kit contains a flashlight with lock-switch, two batteries and bulb, four detachable Lucite rods (two straight-formed and two angled-formed, 3½ and 6 in. long), and three detachable angle-formed mirrors (½, ¾ and 1 in. in diameter). Magnifying mirrors are rated at 1½ power.

Lights permit close examination of inaccessible or hard-to-see areas through the expedient of bending light around corners.

F. T. S. Corp., 309 Vine St., Camden 2, N. J.

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Devcon, a combination of 80% steel and 20% plastic, is available in putty or viscous liquid form.

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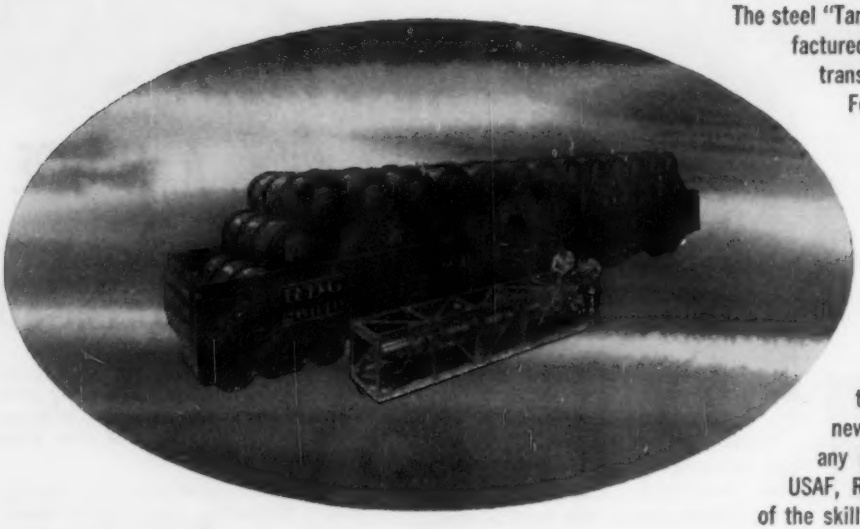

The steel "Tank Cans" designed, developed and manufactured by Royal Jet have revolutionized the transport and storage of aircraft components. For example, six 450 gallon external fuel tanks are nested in each hermetically sealed "Can," thus, 324 tanks may be shipped to a freight car (the space formerly required for 18 crated tanks). The new packaging technique assures maximum protection against shipping and landing hazards... the tanks are indefinitely preserved against atmospheric conditions. The sealed in tanks remain factory-new in any climate... any temperature... for any storage period. Now standard for the USAF, Royal Jet "Cans" are another example of the skill and imagination of American industry.

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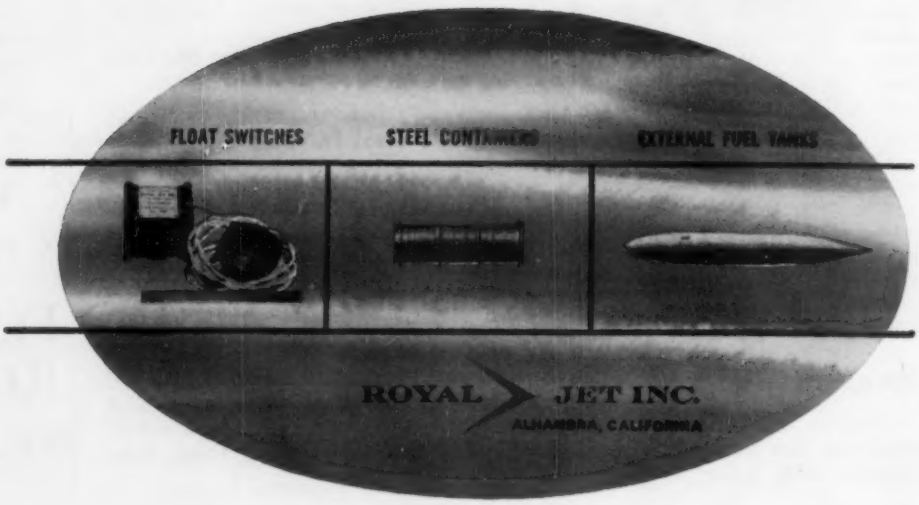

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Cam-operated precision boring machine, Style 312, features fast-changing cams for producing variety of forms.—Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

16S quill adjustable cutterhead permits horizontal, angular and vertical milling plus boring and drilling on one machine without attachments.—Van Norman Co., 3600 Main St., Springfield, Mass.

Airflex cold-flow dimpling is reported to be particularly interesting to aircraft manufacturers because of application on titanium alloys.—Lemert Engineering Co., Inc., 201 E. Jefferson St., Plymouth, Ind.

Executive secretary desk chair Model 633 for multi-engine airline and corporate aircraft has 360-deg. swivel mechanism providing position lock on 15 deg. increments of rotation.—Hardman Tool & Engineering Co., 1845 S. Bundy Dr., Los Angeles 25, Calif.

Optical engineering experimental kit contains wide selection of precision optical components. Priced at $49.50, kit includes prism, cylindrical and spherical lenses and flat, cylindrical and spherical mirrors suitable for use in all types of optical systems and devices.—Houston Technical Labs., P. O. Box 6027, 2424 Branard, Houston 6, Texas.

MicroBrazer soldering tool meets requirements for soldering components of guided missiles—silver solder brazing on small parts to 1,250 deg. Timer is adjustable through a range of 1/60 to 3 sec. Unit also is supplied with foot switch and choice of several models of standard and heavy-duty probes.—Zephyr Mfg. Co., Inc., Inglewood, Calif.

Small portable bench center for grinding index detents has integral surface plate. Mandrel holding work piece and template are set between centers, accurate in all directions to 0.0005 in.—Transicoil Corp. Worcester, Montgomery County, Pa.

Magnesium mounting bases are reportedly 25% lighter than their aluminum counterparts. Galvanic action between magnesium and stainless hard-

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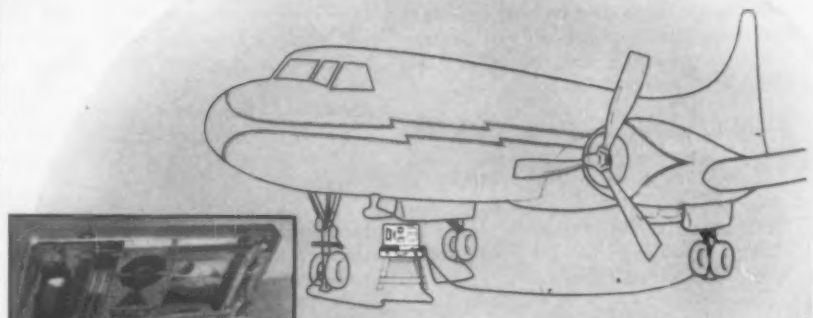

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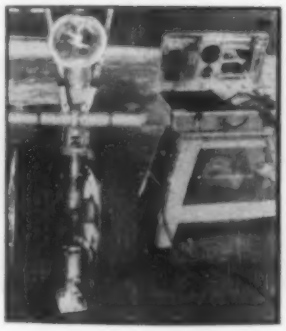

11

Ask for Bulletin C&S-A

COX & STEVENS ELECTRONIC SCALES DIV.

Revere CORPORATION OF AMERICA

WALLINGFORD, CONNECTICUT A Subsidiary of Neptune Meter Company

ware is avoided by padding nylon between the materials.–T. R. Finn Co., Inc., Electronics Division, 200 Central Ave., Hawthorne, N. J.

Vinyl-lined flight case has cut out front and fold-back top for inflight accessibility.–Jeppesen & Co., Aviation Sales Division, Denver, Colo.

Synthetic rubber compound No. 47-671 used in aircraft hydraulic service O-rings permits operation in the temperature range of −65 to +275F–T. J. McCuistion, Rubber Products Division, Parker Appliance Co., 17325 Euclid Ave., Cleveland, Ohio.

Insulated plastic oxygen hose carries radio wire outside the tube, lessening danger of sparks from the wire igniting oxygen.–Dayton Rubber Co., Dayton.

Power reversible, trip-blade snow plow can be angled up to 37 deg. Automatic reversing mechanism can be used in any position and pre-loaded trip spring with linkage to moldboard provides smooth action when obstruction is encountered. –Frink Sno-Plows, Inc., Clayton, 1000 Islands, N. Y.

Hydraulic clamp with rotator and side shifter eliminates need for several attachments for handling various size boxes on fork lift truck, maker reports. Distance between bottom forks and top plate can be hydraulically adjusted from 26 to 76 in.–Yale & Towne Manufacturing Co., 11,000 Roosevelt Blvd., Philadelphia, Pa.

Niagara No. 150 hand operated deep throat combination machine has 12 pair of standard rolls for turning, burring, wiring, elbow edging, beading, crimping, furnace collar edging, body flanging, slitting and trimming.–Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.

GS12D Dekatron cold cathode counting tube has a plug-in base for new applications of glow counting. Envelope design provides a shorter tube with a smooth end-face for improved readability.–Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass.

Nordex power cutter has a detachable crank case for at least six different operations. Quick tool changes make cutting, beading, folding and doming more accessible. Unit has ¾-hp. motor–Nord Corp., Nutley, N. J.

Rectangular shaped vapor spray degreaser for large size parts has fused phenolic interior coating to protect against corrosion. Machine has automatic solvent reclaimer for non-inflammable trichlorethylene vapors used in parts cleaning.–Baron Industries, 241 West Ave., Los Angeles 31, Calif.

Zip-lift wire-rope electric hoist has motor brake and load brake, both of which hold full loads. A 10-ft. lift is standard with larger lifts optional.–P&H Hoist Division, Harnischfeger Corp., Milwaukee 46, Wis.

NLS Model 451 self-balancing digital potentiometer provides automatic digital display of d.c. voltages. Reference voltage for measurement is supplied by a series of mercury cells assembled into a compact battery pack having an operating life exceeding 10,000 hours.–Non-Linear Systems, Inc., Del Mar Airport, Del Mar, Calif.

New hammer has interchangeable heads of aluminum, brass, copper, two types of nylon and three hardnesses of plastic. Spring pin mechanism safely locks head into place.–Hi-Lok Mfg. Co., 1625 Massilon Rd., Akron, Ohio.

Manco hydraulic utility press provides 35-ton thrust for punching, shearing, angle iron notching or forming light-gage metals. Machine operates on a 1⅛-in. stroke with a 1½-sec. operational cycle.–Manco Mfg. Co., Bradley, Ill.

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Functional efficiency was planned into the CH-1. The engine location—in the nose of the fuselage—is an example. This makes installation and servicing easy, provides added cargo, or passenger, space.

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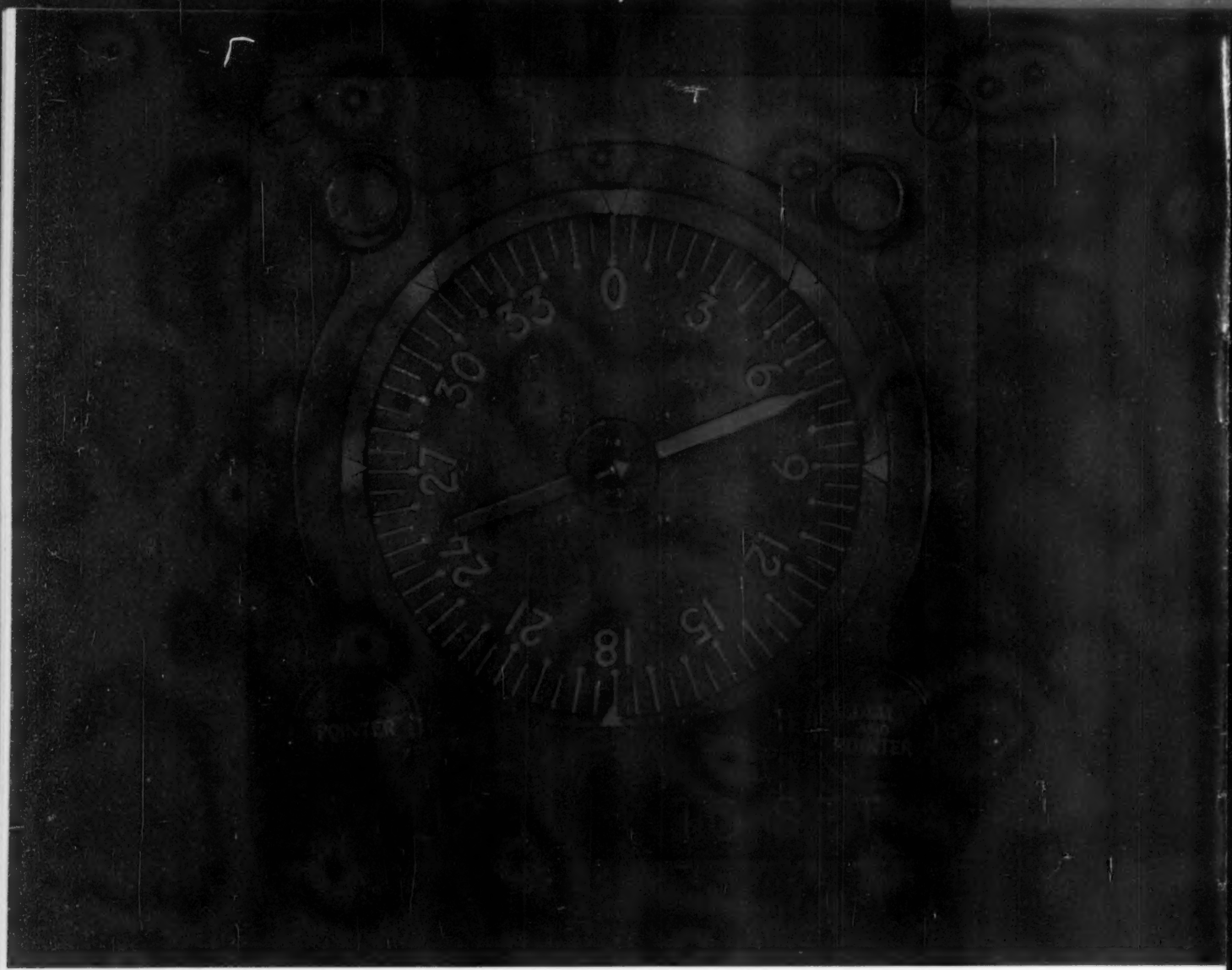

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Piedmont Strengthens Route Structure

Local service carrier enters Washington market; Fokker F-27 turboprop seen as DC-3 replacement.

By Craig Lewis

Winston-Salem, N. C.—Piedmont Airlines entry into the lucrative Washington, D. C., market has strengthened the local service carrier's route structure and underlined the pressing need for the replacement of its DC-3 fleet.

Piedmont has three flights daily now between Washington and Knoxville, Tenn., and the airline estimates the new service will produce an additional 1,800 passengers a month at the beginning and considerably more when it becomes established.

The new route gives Piedmont, one of the biggest local service airlines, access to a large metropolitan market, something it lacks in the mountainous areas of Virginia, Kentucky, North Carolina, West Virginia and Tennessee.

Seek Chicago Entry

The next route improvement Piedmont seeks is entry to Chicago from terminals at Columbus and Cincinnati, Ohio, and Louisville, Ky. The carrier would also like to link stub-end terminals Louisville and Knoxville.

Piedmont figures that about 60% of its passengers going into Columbus, Cincinnati and Louisville are headed for Chicago or points west of there. The carrier wants to carry them on to Chicago and is asking the Civil Aeronautics Board to extend its routes.

If route extensions aren't granted, Piedmont president T. H. Davis told AVIATION WEEK he thought interchange service with an airline flying between Chicago and the three Piedmont terminals is feasible and could be the answer to the need for through service.

According to Davis, Piedmont operates on the theory that a successful local service operation is based on two key factors—frequency of service and high utilization. The carrier claims the highest utilization in the local service industry—slightly over eight hours daily.

Service frequency is considered important in promoting new business. Piedmont finds that the addition of new flights on a segment tends to promote new business for existing flights and has the total effect of raising the segment load factor. The local carrier is currently operating with load factors between 58% and 60% over its entire system. Breakeven load factor is 55%.

Route Adjustments

Piedmont doesn't expect any direct benefit from the recent permanent certification granted to local airlines by Congress. The company didn't favor permanency through legislation but felt that CAB wasn't moving quickly enough to accomplish it within a reasonable time.

All but two points on Piedmont's system meet CAB traffic standards for permanent certification, but the carrier will ask CAB for temporary certification of four points which exceed the five passenger daily standard—Hickory, Pinehurst-Southern Pines, Kingston and Morehead City. While these points could be certificated permanently, Piedmont feels that its routes might need adjustment in the future and temporary authorization for four points will make it easier.

Permanent certification will probably benefit Piedmont most when the time comes to borrow money for replacement of its fleet of 16 DC-3s. Davis told AVIATION WEEK that, while substantial progress is being made, local airlines probably won't get off subsidy until they find a new airplane to replace the aging DC-3. When a suitable airplane is available, the cost of fleet replacement will be high—probably close to $500,000 an airplane.

Davis discounted Martin or Convair equipment as possible replacements for Piedmont. He feels that local airlines should move on to an advanced design when they switch equipment, rather than go to equipment which is already becoming obsolete.

DC-3 Replacement

Davis feels that the Fokker F-27 and the Handley-Page Herald come closest to meeting the specifications. The Fokker is a twin engine, high-wing turboprop transport. The Herald has four piston engines.

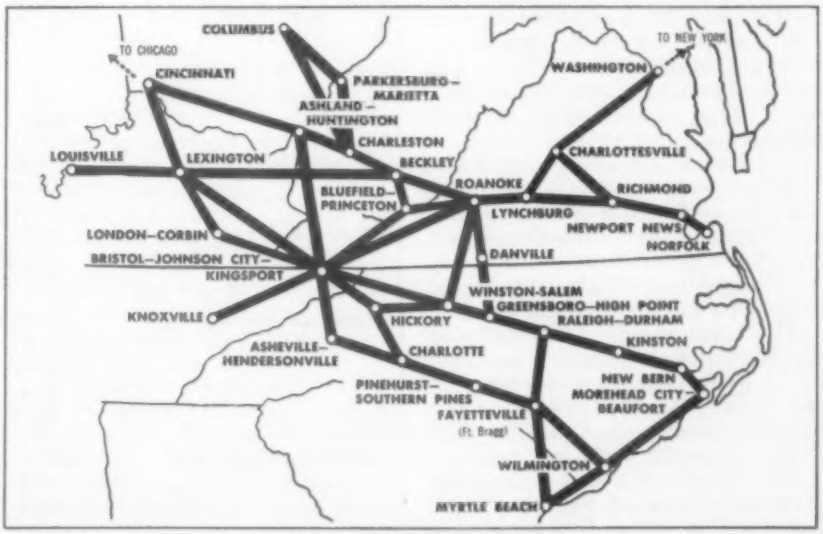
If the F-27 measures up to performance predictions when it flies this fall, Davis feels it offers the best prospect for replacement of the DC-3. A tentative price of about $450,000 has been estimated for the F-27. The Herald prob-

Piedmont Gains

Piedmont Airlines flew 167,663 passengers 32,471,491 passenger-miles in the first six months of 1955 with an average load factor of 50%.

Traffic for the same period of 1954 was 142,951 passengers and 28,677,299 passenger-miles. Load factor was 44%.

Piedmont's total income for the first half of the year was $3,361,322. Net income after provision for taxes was $12,194.



PIEDMONT route system showing new extensions between Knoxville and Washington.

ably will sell for about $375,000.

Davis prefers the two engine airplane because it fits in with Piedmont's philosophy on flight frequency. He says it is smarter for a local airline to run a small airplane on many frequencies than a large airplane on fewer flights.

The Piedmont official also thinks that the F-27 has great passenger appeal because its high-wing configuration gives better visibility as well as making loading and unloading easier.

Pressurization, available on the F-27, not only attracts the passenger, but it contributes to operational efficiency by allowing sharper ascent and descent.

Davis also points to higher speeds, better ground time, lower seat-mile costs and easier maintenance as further advantages over the DC-3. The F-27 will be able to operate out of DC-3 airports where Martins and Convairs would operate with a weight penalty.

He believes there will be a wide executive and military market for the F-27 which will help reduce the price.

New North-South Cargo Network Recommended by CAB Examiner

Washington, D. C.—An extensive new network of all-cargo routes between the Northeast and Midwest and points in the South has been recommended by Civil Aeronautics Board Examiner James S. Keith in his report on the Air Freight Renewal Case.

Riddle Airlines and American Air Export and Import Co. are favored in the report for certification on the north-south routes. They would get a five-year authorization to develop the air freight potential of the routes.

The examiner finds that the certificate of U. S. Airlines, an early all-cargo carrier, should not be renewed.

Keith recommends for Riddle Airlines a route structure between Miami and northern points. One route would run between Boston and Miami via New York, Philadelphia, Baltimore, Washington, Richmond, Jacksonville, Tampa and Sarasota. Another Jacksonville-Miami segment would operate via Palatka, Orlando, Fort Pierce and Stuart.

From the Midwest, Riddle would be authorized to fly between Chicago and Miami via Indianapolis, Louisville, Atlanta, Jacksonville, Tampa and Sarasota with a second Jacksonville segment via Palatka, Orlando, Fort Pierce and Stuart. Beyond Atlanta, Riddle also could serve Cincinnati, Columbus, Cleveland and Detroit from Miami.

American Air Export and Import Co. would get routes between New Orleans and the north under Keith's recommendations. Between New Orleans and New York, AAXICO could serve Birmingham, Atlanta, Richmond, Washington, Baltimore and Philadelphia.

The carrier would get two routes to the Midwest from New Orleans. One would be to Chicago via Birmingham and Indianapolis, and the other to Detroit via Birmingham, Louisville, Cincinnati, Columbus and Cleveland.

The examiner's report is on the north-south phase of the Air Freight Renewal Case. When CAB certificated the all-cargo carriers, it set a five year limit on the experiment, which expired last summer. A consolidated renewal proceeding was instituted to review the air freight situation. This proceeding became delayed last winter, largely due to the failure of the Slick Airways-Flying Tiger Line merger, and Riddle asked CAB to sever the north-south phase for separate consideration.

CAB severed the north-south phase, and Examiner Keith has reported on that portion of the case. He has recommended that policy questions involving carriage of mail and air express on cargo lines be deferred for decision on the east-west portion of the case.

Favorable CAB action on Keith's report would offer extensive north-south all-cargo services east of the Mississippi, service now offered on a limited scale by Delta Air Lines and Riddle. Riddle now operates between New York, Miami and Puerto Rico. AAXICO operates a cargo service between the U. S. and Central and South America and does contract work for the Defense Department.

In his report, Keith says: AAXICO's lack of experience and familiarity with the requirements of a New York-Florida and Midwest-Florida service and Riddle's recognition of its inability to institute service between New Orleans and New York and New Orleans and the Midwest for a considerable period after certification, plus the fact that U. S. Airlines is currently insolvent and has been declared bankrupt . . . emphasizes the need for dividing the routes between two carriers so that operations over all routes can be inaugurated immediately and the Board can have the benefits of a complete five-year experimental record."

In view of the unproven airfreight potential at certain points, the report recommends that a number of them be included in the certificates on a demand basis. Tariffs filed for such points would set a standard of freight volume required before a stop would be made.

On Riddle's certificate, this rule would apply to Baltimore, Washington, Richmond, Jacksonville, Palatka, Orlando, Fort Pierce, Stuart, Louisville, Indianapolis, Cincinnati and Columbus. AAXICO would have Philadelphia, Baltimore, Washington, Richmond, Louisville, Indianapolis, Cincinnati and Columbus as demand points.

Transport Sales' Report Card

U.S. aircraft builders have sold 1,525 commercial transports since the end of World War II. Of the total, 1,149 had been delivered by last week. The breakdown of orders and deliveries, as compiled by Aviation Week:

COMPANY	MODEL	ORDERED	DELIVERED
Boeing Airplane Co.	377	56	56
	707		
Convair, division of General Dynamics Corp.	240	177	177
	340	208	203
Douglas Aircraft Co.	DC-6	174	174
	DC-6A	44	27
	DC-6B	257	184
	DC-7, 7B	151	76
	DC-7C	94	
	DC-8		
Lockheed Aircraft Corp.	1049C, D & E	78	78
	1049G	64	30
	1049H	9	
	1649	34	
	Electra	35	
Glenn L. Martin Co.	2-0-2	31	31
	2-0-2A	12	12
	4-0-4	101	101
TOTAL		1,525	1,149

Mass Volume Helicopter Needed To Make Short-Haul Profitable

By Gordon Conley

Ithaca, N. Y.—Mohawk Airlines wants to resume helicopter service with a multi-engine transport similar to Sikorsky Aircraft's S-56 but with a cabin modified to meet fixed-wing standards and able to carry 35 to 40 passengers. With such a rotary-wing airliner, the local service carrier expects to make its first deep penetration of the short-haul travel market.

"This is the transport that can give us mass volume," Mohawk President Robert E. Peach says. "So far, the airlines' share of short-haul traffic is slightly more than 2%."

Mohawk has been planning eventual conversion to an all-helicopter fleet since its experiment last year with an eight-passenger Sikorsky S-55 (AW Aug. 15, p. 123). In addition to a large rotary-wing transport, the carrier believes these problems must be solved before it can switch from a fixed-wing operation:

• **Heliports.** The local service airline wants assurance that it will be able to operate out of business districts in cities on its routes—particularly in the New York metropolitan area. "We're waiting as much for a New York heliport as we are for a helicopter," Peach says.

• **Public acceptance.** "Communities must be ready for helicopters and realize that the noise of eggbeaters overhead is just as much a part of the normal scene as trucks and trains."

Cost, Operational Studies

Helicopter studies made by Mohawk call for a transport with at least two, but preferably four, engines. It must carry from 30 to 40 passengers, a three-man crew plus baggage, cargo and mail. Minimum cruise speed would be 140 mph. and fuel range 200 miles. The carrier lists no preference on rotor configuration, but Research Director David E. Postle points out that there would be a 15% weight penalty with twin rotors.

Of the U.S. rotary-wing transports now in production, Mohawk is interested only in Sikorsky's S-56. This twin-engine single-rotor copter is being built for the military, however, and it will be at least three more years before a commercial version is offered.

"The S-55 is the most advanced copter now in being," says Postle. "But we'd have to make one or two modifications before we could get the proper fuselage. We need cabins similar to those of fixed-wing transports—close to the ground for quick loading and unloading, four-abreast seats and a straight, not sloping floor."

Mohawk set the capacity minimum at 30 passengers because operating cost and revenue studies showed the expense of flying a smaller helicopter would push fares too high to attract traffic.

"We've got to reduce the average passenger fare on the normal 179-mile short-haul flight from $12 to $8," says Postle, a member of the Air Transport Assn.'s Committee on Rotorcraft and the International Air Transport Assn.'s Helicopter Committee. "We can do this if we have a helicopter with a direct operating cost per available seat-mile of about 4 cents.

"While some operators have planned on the 16- to 20-place helicopter for operation in metropolitan areas, I believe the related seat-mile costs and the required passenger tariffs would preclude sufficient penetration of the short-haul passeneger market. In fact, it is difficult to forecast profitable operations, without mail pay or some subsidy, in any type of scheduled passenger service providing less than 30 seats."

Postle disputes a statement by Robert L. Cummings, president of New York Airways, that short-haul airlines should operate 20-passenger transports on frequent flight schedules in a bus-type service (AW May 23, p. 107). A larger copter, Cummings said, would be hard to fill.

"Mohawk's experience clearly shows that this assumption is not correct," Postle says, "for successful short-haul passenger service is the result of a delicate balance between properly-timed schedules at the hours people desire to travel, adequate capacity of the aircraft at peak travel hours and load factors on each schedule operated."

Postle believes the total operating cost of the helicopter called for in Mohawk's studies can be reduced to below that of fixed-wing transports on short-haul routes.

"Direct operating costs per available seat-mile on any fixed-wing aircraft is about 2 cents," he says. "It goes up sharply on any block distances of 75 miles or less. If the helicopter's operating cost can be brought down to 4 cents, it will remain constant on stage lengths down to about 20 miles."

Passenger Confidence

Mohawk President Peach is convinced the helicopter will give local service airlines a transport able to compete for the first time with railroads, buses and private automobile. He lists these advantages:

• **Passenger confidence.** "The biggest attraction of helicopters from the passenger's point of view is elimination of taxiing and takeoff and landing runs. When a copter lands, the passenger has the same sensation as braking an auto. And this comforts him."

• **Smooth air characteristics.** "There's no such thing as turbulence in a helicopter. It doesn't have a wing forcing its way through the air and taking thermals. The rotors are flexible."

• **Weather maneuverability.** "A rotary-wing transport usually will be able to go under the weather, cutting down on the number of instrument (IFR) approaches a passenger must sit out."

(This is the last in a three-part series on Mohawk Airlines.)

New York Heliport Plan Denied

The Port of New York Authority lost its bid last week to build a $50,000 temporary heliport on Manhattan's Hudson River waterfront and follow this within three to five years by a $5-million permanent facility.

Vincent A. G. O'Connor, New York Commissioner of Marine and Aviation, turned down PNYA's recommendations on grounds that the proposed location of the 100-by-400-foot strip between the Hudson and an elevated highway constituted an "extreme hazard."

As predicted by AVIATION WEEK (July 18, p. 7), O'Connor cited the crash of a Bell 47G last month from the top of the Port Authority's 16-story midtown building. "We believe that tragic event should have alerted you to the public danger inherent in the bulkhead (temporary strip) proposal," he said in a letter to Authority officials.

Replied PNYA Executive Director Austin J. Tobin: "Nonsense."

O'Connor earlier had countered the Port Authority's proposal with a plan to build a waterfront freight terminal in the same general location as the temporary strip and add a rooftop heliport to the facility. He said last week he still favors this construction.

Arguments offered by PNYA Aviation Director Fred M. Glass against O'Connor's plan included studies that indicated the ground-level strip would be safer than a rooftop heliport. He added that the commissioner's proposal also would be only a temporary facility but would cost $550,000 more than the Port Authority's heliport; would take more than a year to build, compared with 30 days for the strip, and would

WHAT DO YOU KNOW ABOUT AVIATION...

Who Made the First Powered Vertical Flight?

One of the small band of pioneers who began to experiment with heavier-than-air flight at the turn of the century, this man made the first powered vertical flight in 1907. In 1911, he set a world's distance record of six miles. He founded a famous aviation company whose planes saw service in both world wars. One of them made the first East-West flight from Paris to New York. His bust is in the American Aviation Hall of Fame in Washington, D. C. His name, *Louis Breguet.*

In 1919 Monsieur Breguet founded France's first airline, which later became Air France. It was he who set the standards of dependability and technical efficiency that have made it possible for Air France to serve the peoples of 76 countries for 36 years.

Louis Breguet just before his death at the age of 75 in 1955.

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not have the operational advantages of the simpler construction.

Glass received strong support from New York Airways, the metropolitan area's scheduled helicopter airline. NYA President Robert L. Cummings said studies by his company favored the strip proposal because it offers:

- **Greater area** for takeoffs and landings and more operational reliability.
- **Full utilization** without involving theoretical performance data and untried flight techniques.
- **Operational flexibility** that will cope with the performance characteristics of future transport helicopters as well as the Sikorsky S-55—the only rotary-wing aircraft considered in O'Connor's rooftop-heliport plans.
- **Complete evaluation** of wind and weather data before a permanent facility is constructed.

HELIPORT PROPOSALS for Manhattan include permanent facility (right) and rooftop plan.

CAB ORDERS

(Aug. 11-17)

GRANTED

Flying Tiger Line an exemption to perform one roundtrip flight between Miami and Paris pursuant to a contract with the Michael Roshkind Co. on behalf of Colonial Pontiac of Miami.

Continental Air Transport Co. permission to intervene in the Helicopter Air Service and Midway Airlines certificate case.

Capital Airways an exemption to perform one flight from Washington, D. C., to London, Ontario, and return to Jackson, Mich., pursuant to a contract with Ray Anthony's Orchestra.

Pan American World Airways an exemption to perform one roundtrip flight between Honolulu and Tafuna, American Samoa, via Canton island with DC-4 equipment in addition to its scheduled service.

Peninsula Airport Commission permission to intervene in the New York-Florida Route Case.

North Central Airlines an exemption to overfly Green Bay, Wisc., on flights scheduled between Wausau, Wisc., and Chicago, Ill., via Milwaukee and Oshkosh, Wisc., for one year.

APPROVED:

Agreements between Continental Air Lines, Braniff Airways and various other carriers relating to inter-carrier arrangements.

Resolutions between various carriers adopted by the International Air Transport Assn. relating to proportional cargo rates between Mexico City and Houston.

DISMISSED:

Caribbean International Airways' application for a foreign air carrier permit since the applicant has ceased operations.

Transocean Air Lines' application for an exemption to perform a flight from New York to Rome at the request of the applicant.

National Airlines' complaint against Eastern Air Lines' proposal to use combination coach/first class equipment in its domestic coach service.

Air Transport Associates' application for a certificate or exemption authority to serve certain routes since the applicant failed to respond to a CAB query.

DENIED:

City of Freeport, Ill., permission to intervene in the Helicopter Air Service and Midway Airlines certificate case.

SHORTLINES

▶ **Air France** carried more than 797,000 passengers in the first six months of 1955, an increase of 22% over the same period of 1954.

▶ **Air Transport Assn.** reports an increase of 20% in scheduled interline business transacted in July 1955 through the Airline Clearing House over July 1954. Amount was $48.9 million in July 1955, as compared with $40.9 million in July 1954.

▶ **British Overseas Airways Corp.** flew 50,623,000 passenger-miles in the two-week period ending July 9. The passenger total was up 21% over the previous record period in September 1953.

▶ **Flying Tiger Line** reported the largest air freight business in its history during June. Revenue for the month was $641,000, as compared with $89,000 for the same period last year. Contract division compiled revenues of $1,431,000 in June, nearly seven times the contract volume for June, 1954.

▶ **KLM Royal Dutch Airlines** carried 25,831,000 ton-kilometers of cargo during the first six months of 1955, 17% over same period in 1954.

▶ **Panagra will grant** 18 travel fellowships for study in U.S. universities to graduate students from countries on its route in Latin America. The students were selected by the Institute of International Education.

▶ **Pan American World Airways** carried 532,508 lb. of cargo between the U.S. and Europe in July, a new cargo record and a 55% increase over July, 1954. PanAm operates eight cargo flights weekly across the Atlantic in both directions. Current plans are to increase the flights to 12 weekly early next month.

▶ **Turkish State Airlines** has started operating seven recently-purchased de Havilland Herons.

▶ **United Air Lines** will start a $6 million expansion program at its San Francisco maintenance base early next year. The expansion program, scheduled for completion early in 1958, will bring United's investment to $16 million.

AAL's June Traffic

June traffic figures for American Airlines (AW Aug. 22, p. 103) were based on partial data. Complete figures are: Revenue passengers, 679,407; Revenue passenger-miles, 408,661,000; Revenue passenger load factor, 73.16%; U. S. mail ton-miles, 1,469,458; express ton-miles, 839,913; freight ton-miles, 5,780,976; total revenue ton-miles, 46,979,870; percentage of revenue to available ton-miles, 63.29%.

Airline Traffic—Second Quarter 1955

	Revenue Passengers	Revenue Passenger-Miles (000)	Revenue Passenger Load Factor	U. S. Mail Ton-Miles	Express Ton-Miles	Freight Ton-Miles	Total Revenue Ton-Miles	Per Cent Revenue to Available Ton-Miles
DOMESTIC TRUNK								
American Airlines	1,947,232	1,133,471	**69.63**	4,510,855	2,474,383	16,642,268	132,756,754	**61.10**
Braniff Airways	426,403	158,398	**63.62**	461,585	292,802	954,118	16,867,871	**57.03**
Capital Airlines	686,119	215,095	**61.00**	860,453	615,042	949,948	22,975,845	**45.31**
Colonial Airlines	125,474	38,313	**60.29**	42,882	18,879	93,734	3,892,989	**57.57**
Continental Airlines	*	59,425	**55.72**	189,959	76,014	361,178	6,314,020	**47.64**
Delta-C & S Air Lines	552,550	231,318	**68.98**	799,159	612,211	1,678,504	27,199,249	**62.83**
Eastern Air Lines	1,702,392	845,589	**64.91**	2,510,891	1,302,505	3,340,787	93,567,924	**53.60**
National Airlines	302,889	211,746	**67.97**	714,409	148,659	1,032,079	23,424,795	**66.65**
Northeast Airlines	138,774	28,008	**58.22**	32,704	41,053	105,510	2,730,093	**56.68**
Northwest Airlines	337,290	219,294	**58.33**	1,132,306	628,543	1,568,202	24,940,991	**52.55**
Trans World Airlines	998,112	741,319	**68.03**	3,213,360	1,830,420	5,845,418	81,871,642	**62.13**
United Air Lines	1,459,647	1,040,431	**69.61**	6,422,793	2,883,389	10,628,889	120,153,968	**60.37**
Western Air Lines	275,693	127,813	**59.54**	626,614	201,615	659,144	13,696,156	**55.21**
LOCAL SERVICE								
Allegheny Airlines	94,053	15,002	**49.58**	19,442	42,818	.....	1,493,251	**49.49**
Bonanza Air Lines	25,858	5,628	**43.40**	9,891	5,444	15,041	568,062	**42.00**
Central Airlines	24,954	3,964	**28.41**	12,233	4,408	14,198	409,931	**25.71**
Frontier Airlines	44,488	11,684	**45.70**	43,834	21,141	178,944	1,360,274	**55.86**
Lake Central Airlines	29,236	4,369	**36.10**	7,335	28,187	.....	433,599	**33.27**
Mohawk Airlines	68,819	12,297	**61.65**	12,839	18,914	20,306	1,223,141	**61.32**
North Central Airlines	110,496	17,447	**57.63**	49,081	64,605	.....	1,773,120	**46.00**
Ozark Air Lines	67,273	10,126	**39.54**	20,021	35,762	.....	1,001,977	**39.68**
Piedmont Aviation	100,267	19,236	**55.08**	27,982	27,539	37,501	1,934,266	**54.36**
Southern Airways	45,903	7,779	**44.68**	25,213	31,562	.....	800,782	**42.45**
Southwest Airways	70,688	13,406	**56.40**	19,608	13,574	38,574	1,349,044	**57.32**
Trans Texas Airways	40,702	9,241	**39.68**	33,868	17,396	41,175	972,568	**36.71**
West Coast Airlines	53,955	9,059	**44.80**	11,450	5,868	22,633	863,243	**48.35**
INTERNATIONAL								
Braniff Airways	8,925	19,842	**46.29**	93,105	.....	262,691	2,594,136	**47.48**
Delta-C & S Air Lines	12,374	14,011	**47.18**	20,936	.....	178,876	1,640,934	**39.98**
Eastern Air Lines	46,410	64,828	**66.40**	166,382	.....	234,978	7,310,833	**60.35**
Northwest Airlines	25,205	49,930	**53.83**	2,491,128	46,899	1,792,300	9,650,555	**64.08**
Pan American World Airways								
Alaska	20,672	24,946	**59.29**	98,799	.....	1,164,117	3,785,552	**49.80**
Atlantic	228,265	287,570	**68.27**	2,521,036	.....	4,651,169	37,179,556	**66.96**
Latin America	239,200	230,845	**63.50**	972,642	.....	7,455,893	30,844,595	**60.51**
Pacific	57,377	179,128	**70.68**	3,695,483	.....	3,190,829	25,606,022	**68.37**
Pan American-Grace Airways	33,789	39,846	**59.17**	180,685	.....	635,346	5,057,438	**56.22**
Trans World Airlines	69,052	179,539	**71.05**	2,103,372	.....	2,008,748	23,057,424	**72.09**
HAWAIIAN CARRIERS								
Hawaiian Airlines	99,927	13,403	**62.87**	11,861	.....	385,145	**1,563,585**	**55.42**
Trans-Pacific Airlines	50,159	6,381	**55.15**	2,994	252	26,789	**527,080**	**54.31**
CARGO LINES								
Flying Tiger Line	*							
Riddle Airlines	.....	.....	.....	.....	.....	3,132,876	3,132,876	**83.58**
Slick Airways	128	168	**26.79**	.....	.....	4,022,694	4,085,370	**70.96**
HELICOPTER SERVICE								
N. Y. Airways	6,524	132	**51.30**	4,054	3,171	1,375	20,875	**53.74**
Los Angeles Airways	1,267	29	**16.02**	14,688	5,209	.....	22,324	**40.65**
Helicopter Air Service (Chicago)	None	.....	.....	7,361	.....	.....	7,361	**42.70**

* Not Available

Compiled by Aviation Week from Air Transport Assn. Reports.

(For First Quarter Figures See Aviation Week, June 20, p. 98)

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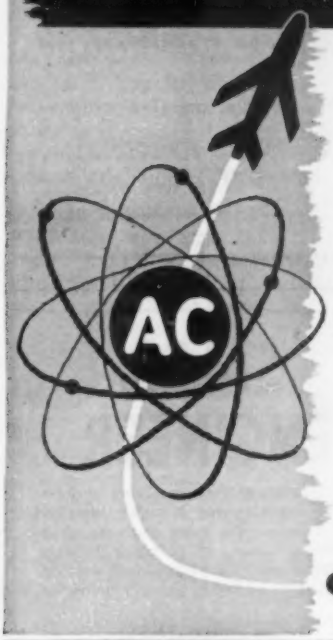

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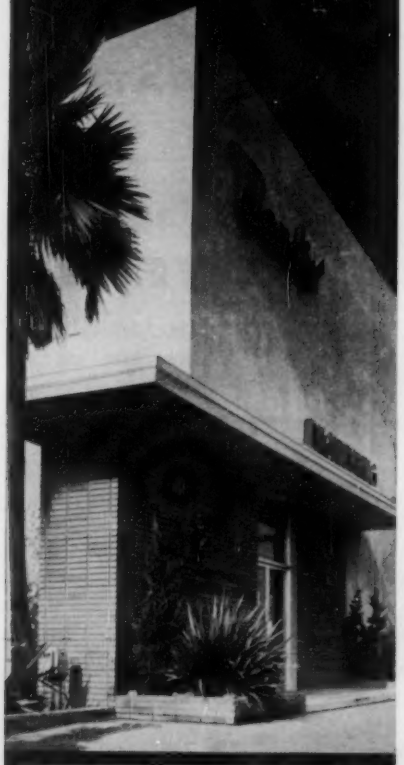

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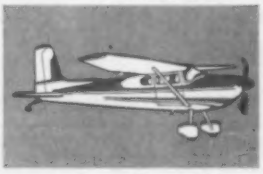
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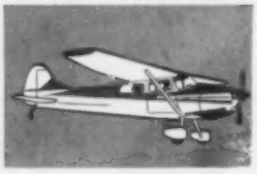
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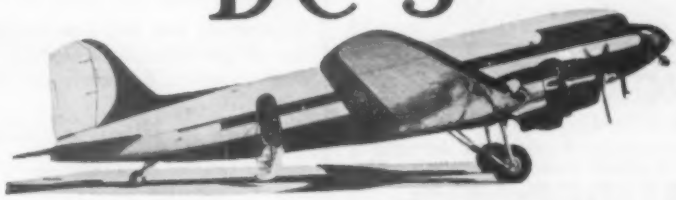

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EDITORIAL

Danger Signals in the Orient

There are many danger signals visible in the Orient today that indicate the Sino-Russian alliance plans further aggression on our Far Eastern frontier. These danger signals are clear and unmistakable despite the fact that daily newspapers' headlines from the Orient are now featuring a "cease-fire" and "peace" talks and the release of USAF prisoners illegally held by the Chinese for more than two years.

AVIATION WEEK's military editor Claude Witze reported recently from Korea (AW Aug. 1, p. 12) on the Communist increase of air strength in North Korea less than ten minutes flying time away from the United Nations bases in South Korea and within easy striking distance of Japan. All of this air activity, including reinforcement of the Communist air force with 300 MiG-15s, building of 35 airfields, construction of underground hangars and fuel storage dumps, is in direct violation of the Korean truce agreement. Any one who may be heartened by the Communists new look of sincerity and geniality at Geneva should look at how they have brazenly violated the Korean truce terms.

Reds Learned Lesson

The Communists know full well, even if the American people don't, that U. S. airpower—USAF, Navy and Marines—was all that prevented a complete Communist victory on the Korean Peninsula. They made a great mistake in underestimating the effectiveness of U. S. airpower, and they don't intend to make the same mistake twice.

Another story of Communist air strength increases comes in private communications from two top American air commanders in the Far East. Although they represent two different services, their views of the enemy opposing them are strikingly similar, and they deserve wide dissemination among the American people.

They report that Communist air strength in the Far East stretching from the maritime provinces of Siberia to the South China sea coast now totals more than 7,000 planes including MiG-17 fighters and Il-28 twin jet bombers. They estimate the Russian air strength along the Siberian coast to be far in excess of what would be required for purely defensive operations. These Siberian bases bring both the Il-28 bombing force and the MiG-17 fighters equipped with auxiliary fuel tanks (of which AVIATION WEEK published photos, Mar. 14, p. 96) within easy range of virtually all USAF and Navy bases in Japan.

On the southern end of the Communist line, they report an unremitting effort to build air bases, logistical support lines and auxiliary facilities in the provinces of Fukien, Kwangtung and Kiangsi opposite the Formosa Straits. This effort is continuing at the same steady pace during the "cease-fire" talk as it did when American newspaper headlines shouted blackly of the imminent invasion of Formosa and the off-shore islands.

Americans who operated with General Claire Lee Chennault in these same provinces during World War II are familiar with the difficulties of logistical support for a sustained air offensive from this area. Many of the fields now being enlarged by the Communists to take jet aircraft were originally built by the Chinese Nationalists and used by the P-40s and B-25s of the 14th Air Force to smash at Japanese air training centers on Formosa and destroy shipping in the Formosa Straits. These Americans who used Kanchow, Changting, Suichwan and other East China fields now being modernized by the Communists are also aware of the advantages of tactical surprise they afford and how difficult it can be for counter air operations to destroy a force effectively shuttled between these staging fields and main bases inland beyond the range of either Formosa or carrier-based bombers.

These three reports paint a consistent picture of Communist air acceleration all along the Far East frontier from Siberia to the South China Sea.

The Communist professions of peace at Geneva and elsewhere should be evaluated against the facts of their steady increase in air strength all along the Far East frontier and the tremendous research, development and production effort the Russians are now operating to build offensive airpower for themselves and their Communist satellite nations.

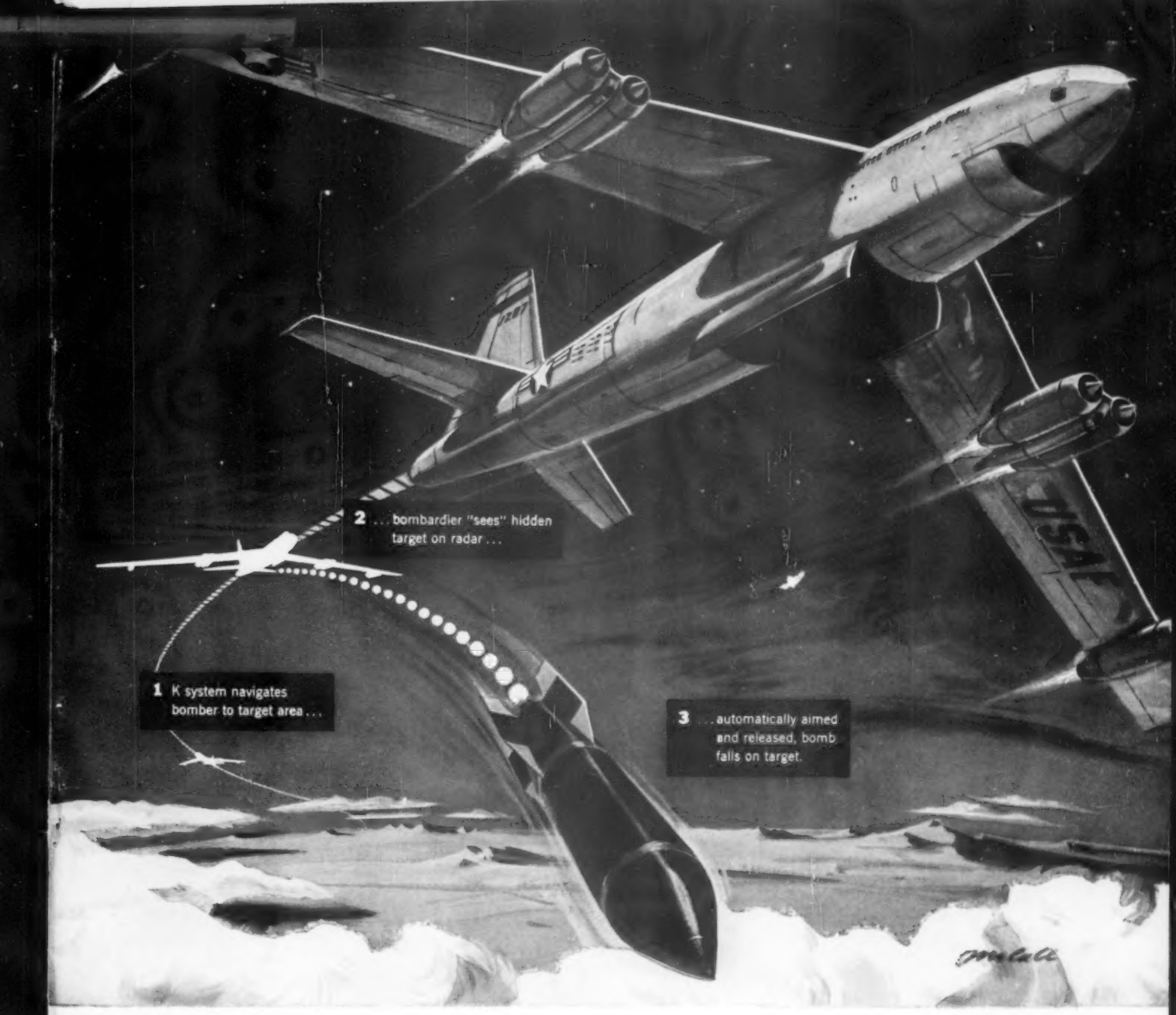
Now Not a Time To Relax

Words can be changed swiftly from peace to war, and history is full of treaties that were torn up in a trice. But it takes many years of steady and skillful effort to build effective airpower. If we relax our effort to produce superior airpower and accept a ban on atomic weapons as a result of the current vogue of Communist lullabies we will have suffered a major defeat and handed our enemies a significant victory.

We now enjoy a margin of atomic airpower superiority over the Communists and that is all that has kept Western Europe and many other parts of the world out of the Communists' clutches. The size and significance of our airpower superiority margin has diminished in recent years as the Russians have accelerated their air effort and we have voluntarily reduced our own pace.

Unless we accelerate the pace and scope of our airpower program to regain a clear and significant lead over the Russians we are doomed to a position of inferiority around the diplomatic conference table.

—Robert Hotz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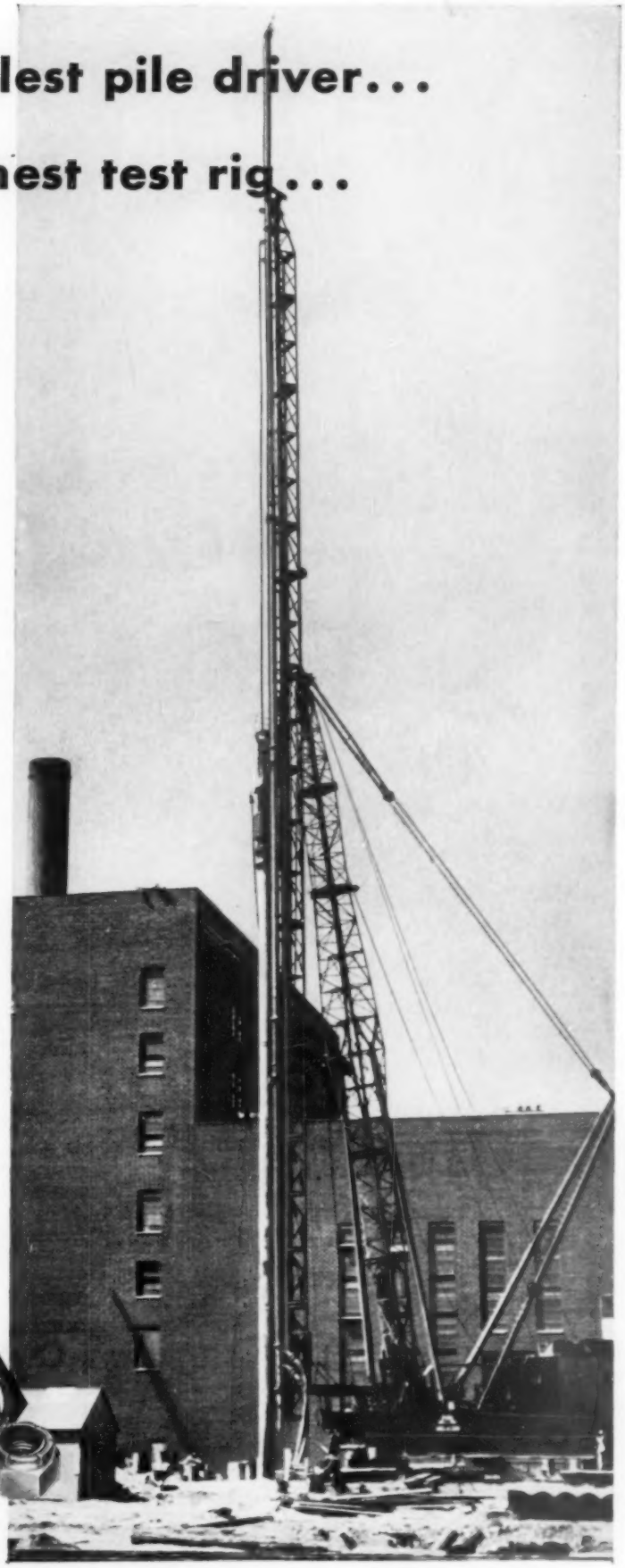

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